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ELECTRIC RAILWAY TRACTION

A Supplement illustrating and describing developments in Electric Railway Traction is presented with each copy of this week's issue.

The Minister Gives a Lead

SPEAKING at the annual dinner of the Institution of Locomotive Engineers last Friday, Dr. Leslie Burgin, the Minister of Transport, made some significant remarks about the possibility of increasing railway safety, and stressed the importance of research into the development of any devices which might even further improve the high standard already maintained by the railways. He congratulated those administrations that were adopting on their locomotives speed indicators and recorders which, besides letting the driver know at what speed he is travelling, provide reliable evidence afterwards that speed has been neither excessive nor unduly reduced at any particular point. The more the driver is helped, and the more speed is made a matter of engineering control and less a matter of unrecorded action by the human element, the better would be the ultimate results; and, arising out of this, the Minister further expressed his lively interest in the development and application of automatic train control. There is little doubt that we are on the eve of important developments in the direction of A.T.C.—developments that are more complicated than many imagine and will need handling as part of the whole problem of general signalling progress.

Viscount St. Davids

"St. D.," as the late Lord St. Davids was familiarly called by his business associates, had an indirect connection with British railways, in addition to his more intimate and well-known association with the development of the Buenos Ayres & Pacific system, which provides the great international highway between the capitals of Argentina and Chile. This connection arose from his directorship of the British Electric Traction Co. Ltd., the board of which he joined in 1925. That company has a direct or indirect interest in most of the large bus companies in England and Wales, and in nearly all cases the relative British railway is the partner of the B.E.T. in those concerns. As a director of the parent company Lord St. Davids was able to give great assistance by bringing to bear his wide general knowledge of finance and transport. He was always ready to help and advise those who worked with him, both in connection with their business and personal difficulties. Considerate with all, he was nevertheless firm and determined if he had reason to think that any undue advantage was being taken of his courtesy and kindness The other railway interests of Lord St. Davids both in South America and elsewhere are more fully set out in an article on page 670.

* * * *

The Week's Traffics

Comparison of the traffics of the four main line companies for the past week is with Good Friday week of last year. Passenger train receipts are, in consequence, heavily down. Merchandise receipts show substantial gains, but they and the more moderate advance in coal receipts are not nearly sufficient to counteract the passenger decrease. The Southern with its comparatively small merchandise and coal traffics is affected proportionately much more than the other companies in the comparison with a week carrying the heavy long-distance traffic of the Easter holidays. Latest returns of the Irish railways compare with those of a week in 1937 which included Good Friday. The Great Northern is down £2,850 in passengers and £1,100 in goods for the week, and Great Southern passenger receipts show a decrease of £6,835, with a goods decrease of £5,203.

	12th Week				Year to date	
	Pass., &c.	Goods, &c.	Coal, &c.	Total	Inc. or Dec.	
	£	£	£	£	£	%
L.M.S.R.	− 220,000	+ 57,000	− 5,000	− 168,000	+ 131,000	+ 0·93
L.N.E.R.	− 119,000	+ 56,000	+ 26,000	− 37,000	+ 307,000	+ 2·99
G.W.R.	− 99,000	+ 21,000	+ 2,000	− 76,000	+ 115,000	+ 2·00
S.R.	− 132,000	+ 10,500	+ 500	− 121,000	− 11,000	− 0·26

Mersey receipts for the past week are up £309, bringing the increase for the 12 weeks to £1,742. On the Liverpool Overhead the receipts for the week show an increase of £130, and for the year to date an improvement of £2,018. London Transport takings for the week are £27,300 up, and the total for the 39 weeks is £21,895,200, an advance of £127,600.

* * * *

Centenary of the T.P.O.

Centenaries provide convenient occasions for paying deserved tributes to work well done and for affording members of the general public an opportunity of having a bird's eye view of some notable phase of development. These remarks apply with peculiar force to the centenary celebrations of the travelling post office which were inaugurated at Euston station on Monday. Both the Postmaster-General and Sir Josiah Stamp referred appreciatively to the constant and cordial co-operation between staffs of the Post Office and the railway companies which has made possible the unobtrusive but efficient growth of the modest enterprise inaugurated a hundred years ago with one vehicle to an enormous undertaking covering

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the whole of Great Britain. The idea of sorting mails *en route* was mooted by Rowland Hill as long ago as August, 1826, when he suggested that three hours might thus be saved in delivery. The suggestion of sorting in horse-drawn road vehicles fitted with shelves was never carried out, and it was left to the railways to introduce this valued feature of the postal service in 1838. On pages 662-667 we publish an article on the centenary of the T.P.O., and on page 675 a brief account of the ceremonies of Monday last.

* * * *

Mauritius Government Railways

Far the greater part of the sugar produced in the colony during the financial year ended June 30, 1937, was carried by the Mauritius Government Railways Department, and the receipts from sugar and canes traffic on the main lines amounted to Rs. 1,164,226, an increase of Rs. 80,440 in comparison with the previous year. The length of line worked was 110½ miles of 4 ft. 8½ in. running lines besides sidings and also the 13⅔ miles of the 2 ft. 6 in. Bois Chéri Light Railway. Passenger revenue again fell off mainly because of the increased size and speed of buses as well as the use of communal taxis and some reduction in unprofitable train services. The Transport Control Board has not yet functioned in such a way as to stabilise passenger traffic as between the railway and the road.

	1936–37	1935–36
Passengers	2,782,628	2,972,736
Paying goods, tons	454,622	422,811
Train-miles	465,164	477,984
Operating ratio, per cent.	92·08	92·06
	Rs.	Rs.
Passenger receipts	433,446	466,307
Goods receipts	1,382,570	1,288,520
Total receipts	1,958,713	1,918,432
Total expenditure (excluding Rs.300,000 for renewals)	1,803,631	1,766,151
Net receipts	155,082	152,281

Receipts from general goods on main lines improved from Rs. 189,269 to Rs. 192,488, and receipts from goods carried in railway lorries from Rs. 400 to Rs. 7,548.

* * * *

Silver Jubilee of the N.U.R.

On Tuesday last, March 29, the National Union of Railwaymen celebrated its Silver Jubilee and we add our congratulations to the hosts which have been received at Unity House, the headquarters of the union. Our contemporary *The Railway Review* has published a special commemoration supplement in which Mr. John Marchbank, the General Secretary, tells again the story of the fusion of the unions which took place in 1913, and records the progress made during the past 25 years. The figures which he quotes are indeed impressive and indicate the growing strength of the union. In 1913 the membership was 159,261; today it is 364,356, an increase of 205,000, while the funds, which in 1913 totalled £394,000, have now reached £2,220,000. In concluding his review Mr. Marchbank declares that "the gains to railwaymen in freedom, in working and living conditions, and the general standard of living of themselves and their families in the period from 1913 to 1938 were greater than were all the achievements of railway trade unionism from the beginning of railways to 1913."

* * * *

"Wells Fargo"

In the U.S.A. the name "Wells Fargo" is as familiar as Pickford in Great Britain, and the film to which we make reference on page 669 will give the famous American firm still wider recognition. William George Fargo was born on May 20, 1818, and from the age of thirteen he had to support himself. He became a freight agent for the Auburn & Syracuse Railroad at Auburn in 1841; an express messenger between Albany and Buffalo a year later; and in 1843 a resident agent in Buffalo. In 1844 he organised, with Henry Wells (1805-78) and Daniel Dunning, the first express company (Wells & Company; after 1845 Livingston & Fargo) to engage in the carrying business west of Buffalo. In March, 1850, the American Express Company was organised, through a consolidation of competing lines, with Wells as President and Fargo Secretary. In 1851 Wells, Fargo, and others, formed Wells, Fargo & Company to conduct an express business between New York and San Francisco *via* Panama, and on the Pacific coast. In 1861 Wells, Fargo & Company bought the Overland Mail Company, formed in 1857 by Fargo and others, to carry U.S. mails. From 1868 to his death on August 3, 1881, Fargo was President of the American Express Company, with which in 1868 the Merchants' Union Express Company was consolidated. He was also a director of the New York Central and of the Northern Pacific Railroads.

* * * *

L.N.E.R. and Southern Pooling Proposal

An interesting development in pooling is the notice given by the London & North Eastern and Southern Railway Companies that they are proposing to enter into an agreement for the pooling of certain of their receipts from the carriage of merchandise traffic between Great Britain and the Continent. The two companies have made application for the consent of the Minister of Transport under Section 19 of the Railways Act, 1921, to their entering into such agreement so far as it relates to the pooling of receipts from the conveyance of such merchandise traffic by rail in Great Britain. It will be seen from this notice that the proposed arrangement is on a very limited scale. The Southern has had for many years a pooling scheme for competitive traffic with the Great Western, but it was no party to the comprehensive pooling arrangements made by the three other main-line companies among themselves and sanctioned by the Minister of Transport. The first to receive ministerial approval, after a long hearing, was that between the L.M.S. and L.N.E. Railway Companies in August, 1932. A similar pooling scheme for traffic competitive between the Great Western and L.M.S. Railway Companies, as well as a tripartite pool between those companies and the L.N.E.R. in respect of traffic in which they were mutually interested, was approved by the Minister in April, 1933.

* * * *

Defence of Transport Against Air Attack

A summary of how far air raid precautionary measures can be expected to protect railway property, and suggestions for peace-time planning of an organisation as little susceptible as possible to complete dislocation by air attack, were given in a paper read to the Institute of Transport on March 28 by Wing Commander E. J. Hodsoll. The speaker, who is Inspector General of Air Raid Precautions, stated that he would place control centres first on the list of places requiring protection. As 100 per cent. protection is impracticable, the criterion should be protection of such offices against blast and splinters, and sufficient overhead cover to prevent penetration by incendiary and, possibly, the lighter high-explosive bombs. At the same time he put forward for consideration the establishment of a duplicate skeleton control system, with its centres situated at places unlikely to be attacked. For signal boxes, splinter proofing is in most cases all that can be done. The speaker suggested that

the railways should study the avoidance of concentrations of locomotives and rolling stock in running sheds and yards. In meeting gas, he recommended that the companies should make themselves as independent as possible of local authorities in dealing with its effect.

* * * *

Delays at Level Crossings

Every level crossing in Great Britain, it is estimated by the Automobile Association, is closed to road traffic twenty times in an eight-hour day, remaining shut for an average of three minutes a time. Accepting this average, the 4,560 crossings in England, Wales, and Scotland cause a loss of 4,560 working hours. But the financial implication of that wasted time is greatly multiplied when the lines of vehicles delayed, every one probably containing an average of two persons, are considered. If a monetary value could be placed upon the time that would be saved were level crossings to be abolished, and the resulting sum capitalised, it would probably provide dramatic justification for giving immediate effect to the recommendation of the Royal Commission on Transport in 1929. This urged that the Ministry of Transport should formulate and give effect to a programme on a wide scale for the speedy elimination of level crossings on all classified roads. Although this has not been realised, the A.A. acknowledges the co-operation of the railway companies in eliminating complaints of undue obstruction, without which the inconvenience would be much greater than it now is.

* * * *

Accelerated Stopping Services

With the new three-car diesel train which ran a trial trip last week, as described in our issue of March 25, the L.M.S.R. is to make a practical experiment on its Oxford—Cambridge line in the development of traffic where steam working entails certain difficulties. The numerous intermediate stations which have to be served on this route have impaired the overall speed that could be provided with steam trains between Oxford and Cambridge, as well as the general facilities for such important centres as Bicester, Bletchley, and Bedford. The nature of the country through which the line passes—mainly agricultural, with the exception of a number of brickfields—is not such that it can support separate stopping and fast services. It is hoped that the accelerative and braking powers and high maximum speed capability (75 m.p.h.) of the diesel train will solve the problem by enabling the necessary stops to be made, together with an improvement in overall journey times. What can be done in this direction has been demonstrated by the *trains légers* of the Belgian National Railways—originally light steam trains, but now being widely replaced by diesels. Accelerated stopping services have there proved not only their practicability, but their powers of developing traffic.

* * * *

The Australian Gauge Question

Once more the question of unifying the various railway gauges in Australia has come before the public as a result of the views expressed by well-known railwaymen who visited Australia recently in connection with the 150th anniversary celebrations. In our overseas columns this week we quote Lord Craigmyle, Sir Josiah Stamp, and Mr. G. R. Taylor, all of whom stress the financial rather than the physical aspect. Looking at it solely from the latter point of view, however, and bearing in mind the recent development of the engineering industry in Australia, there should be no serious difficulty in unifying the gauges throughout the continent. Australia has ample skill and labour readily available and should find no difficulty in providing the necessary new rolling stock, although the rate at which it could be delivered might not be rapid. Were it considered desirable to accelerate the programme of unification, Australia's capacity to increase her surplus of foodstuffs should make it possible to obtain, in exchange for this surplus, equipment which could with equal facility be produced as surplus to the requirements of some industrial country such as Great Britain. In face of this realistic conception of the matter, and presuming that the function of finance is to facilitate the distribution and exchange of goods and services, the Australian gauge problem would appear to be susceptible of quite simple solution.

* * * *

Locomotive Cleanliness

In the winter a marked improvement in the external appearance of locomotives usually sets in. Traffic demands at the height of the summer holiday season are so heavy that many firemen are temporarily promoted to drivers; and cleaners, in their turn, are drafted to firing, so that cleanliness suffers most in that and the immediately succeeding part of every year. In winter and spring the position at the sheds is improved, and the emergence of locomotives from overhaul in the glory of restored paintwork adds a touch of brightness to railway operation which might, however, be more permanent than it generally is. For observation proves that some sheds devote considerably more attention to external cleanliness than others. There is also, of course, a variation in the standards aimed at in different companies, the highest in our opinion, as indicated in our issue of March 4, being those of the Southern. It is a pity that more cannot be done by competition to promote rivalry in cleanliness between shed and shed. Railways have their prize lengths of track, in judging which both good order and appearance are taken into account; prizes are awarded for the best-kept stations; the L.M.S.R. has its On Time League, with trophies for operating efficiency. Why not a similar contest between locomotive sheds, in which both freedom from preventable casualties to locomotives and their internal and external condition would be taken into account? This plan would have the double advantage of aiming at reliable locomotive operation, and of exhibiting at all times to the public locomotives whose smartness would have no small publicity value for their owners.

* * * *

Public Schools on Posters

In what environment is the neck that wears an old school tie trained to fulfil its lofty destiny? Authorities ranging from the author of "Tom Brown's Schooldays" to the Western Brothers have supplied their answers, but curiosity in this matter seems never to be satisfied finally. A useful addition to knowledge of the subject now comes from the London Midland & Scottish Railway, which has issued a series of posters by Mr. Norman Wilkinson, P.R.I., entitled "Famous Public Schools on the L.M.S." In the architecture, atmosphere, and setting of his subjects, the artist has found material of beauty and interest, amplified by brief remarks on every poster concerning the history and customs of the school depicted. A list of the 15 schools represented was published in our issue of October 22. This poster series will undoubtedly have a wide appeal. The public schoolboy himself is secretly curious to know the conditions in which other members of his species are raised, although as regards the internal policies of establishments other than his own he is an isolationist and non-interventionist of some centuries' standing.

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Argentina and Nationalisation

THE Argentine Ministry of Public Works has sent a message to Congress asking for the speedy approval of the Bill providing for the purchase of the Cordoba Central Railway, and setting forth the economic advantages to the State of the acquisition of the line, as this would give the National Railways direct access to the port of Buenos Aires. The message stated that at present the goods transhipped to the river steamers amounted to approximately 100,000 tons per annum, while the traffic forwarded by other railways accounted for 620,000 tons more. The Government estimated that the transfer of the line to the State Railways system would effect a saving of some six million pesos in the working expenses of the railway. If to this sum the net yield of the financial year 1936-37 were added, a total of $9,562,000 paper would be obtained, which would be more than sufficient to cover the interest and amortisation charges on the purchase price and the restoration of the salary cuts. Finally, the message stated that the purchase price of £9,500,000 sterling represented only about half the actual value of the assets.

The most significant feature of the message was the stress laid on the advantages which the State would derive from the nationalisation of all the railways. In this connection, the message stated that the tariffs should suffice only to cover working expenses and renewals, to the exclusion of commercial interests and high directors' fees. This could be achieved only by nationalisation, and the railways would not yield all the benefits which the country was entitled to derive from them until this end had been attained. Such a policy would also help to solve the problem created by the vast distances to be traversed in Argentina, and the resulting inequality between producers in different zones. Furthermore, labour disputes would be avoided, as the employees, besides the realisation that they were serving the interests of their country, would receive more liberal remuneration, especially during times of prosperity. The message stated that Argentine railway employees were becoming convinced that shareholders had no right to any dividends, and there existed a growing resistance to any contribution being made, at the cost of their salaries, towards the companies' fixed charges.

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German Railways in 1937

THE year 1937 was one of exceptional activity for the German railways, and the traffic (passenger-kilometres, freight-ton-kilometres, axle-kilometres, and train-kilometres for both passenger and goods traffic) increased even beyond the records of 1929. The total receipts for passenger traffic and luggage, according to provisional statistics, amounted to 1,160,000,000 RM., about 8 per cent. more than the previous year. Receipts for goods traffic are provisionally reckoned at 2,960,000,000 RM., compared with 2,635,600,000 RM. in 1936, an increase of about 12 per cent. In passenger traffic there was a 16 per cent. rise in the number of passenger-kilometres, but only an 8 per cent. rise in receipts; in goods traffic there was a rise of 15 per cent. in ton-kilometres compared with 12 per cent. in receipts. Still greater are the discrepancies between traffic and receipts for the two years 1929 and 1937. Here, the number of passenger-kilometres rose 7 per cent., but receipts for passenger traffic fell 19 per cent.; in goods traffic the number of ton-kilometres rose 6 per cent. and receipts fell 15 per cent. These discrepancies can be attributed to the drastic changes brought about by the various reductions in tariffs on the German railways since 1929 and the various special tariffs which have been part of their programme. While in 1929 the earnings were 3·02 pfennigs a passenger-mile and 4·56 pfennigs a ton-kilometre without tax, in 1937 the corresponding figures were 2·30 pfennigs and 3·65 pfennigs.

The German railways have been confronted with important and novel tasks in the operation of goods traffic, especially owing to the now urgent problem of providing the various industries with home-produced raw materials, and to certain other questions arising from the four-year plan. Tariffs have been reduced where possible. The total receipts on the railways for 1937 are provisionally reckoned at 4,400,000,000 RM. compared with 3,984,800,000 RM. in 1936, an increase of about 415,000,000 RM. or 10·4 per cent. In 1936 total expenditure was 88·16 per cent. of the receipts, while the 1937 percentage is provisionally estimated at 85 to 86. This improvement is due to the fact that although expenditure rose 7 per cent. compared with 1936, it was outstripped by the increase in receipts. It is also interesting to note that the average number of employees for the year rose by about 55,000 to about 720,000. Goods traffic again developed favourably last year owing to the improvement in German trade. The execution of the four-year plan is already affecting nearly all sections of industry, trade, and agriculture. There was a consequent increase in the number of trucks made available throughout the year; in fact, the daily average was 8·5 per cent. higher than last year.

In passenger traffic, including the town and suburban railways at Berlin and Hamburg, the number of passengers was about 11 per cent. and that of passenger-kilometres about 16 per cent. higher than last year. The corresponding increases in 1936 compared with the previous year were 8·2 per cent. and 10·1 per cent. The average length of journey rose from 27 km. in 1936 to about 28 in 1937; the figure for 1935 was 25·6 kilometres. There were many more journeys at reduced fares last year. In general traffic, excluding the town and suburban railways at Berlin and Hamburg, the number of passengers was about 11·7 per cent. and that of passenger-kilometres about 17·5 per cent. higher than in 1936, when the corresponding increases on the previous year were 8·2 per cent. and 10·7 per cent. The average length of journey in general traffic was 33·3 km. in 1935, 34·1 in 1936, and about 35·4 in 1937. The proportion pertaining to third class in traffic and receipts rose slightly compared with the previous year and once more reached the figure for 1935.

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Concrete Tube Tunnels

AFTER exhaustive tests, the London Passenger Transport Board has decided to use reinforced concrete in the construction of 2½ miles of running tunnel in north-east London, where the Central Line is being extended to Epping, Ongar, and Hainault. The length of concrete tube will be between the intersection of Red Bridge Lane and Eastern Avenue—where a new tube station, Red Bridge, is to be built—and the L.N.E.R. station at Newbury Park, where the tube lines will come to the surface and continue over the L.N.E.R. to Hainault. This will involve the use of 48,000 segments and 8,000 keys (small segments), costing about £72,000. Cast iron, in the form of segments placed in position and bolted together by hand, has been used to line tube tunnels for some 40 years. About six months ago, when serious difficulty was experienced in obtaining supplies of cast iron for new works, Messrs. Mott, Hay & Anderson, the board's consulting engineers, who have long been closely watching advances in concrete technique, submitted a concrete seg-

ment of a type as strong and as easily handled as a metal segment.

Many interesting experiments were made. Of the chief pressures that have to be resisted by the lining of a tunnel, one is that exerted upon it in a horizontal direction by the hydraulic rams used to push forward the tunnel shields. These rams may exert a pressure of as much as 560 tons. To ensure that the reinforced concrete would withstand this heavy pressure, complete rings were erected in one of the new tunnels under construction, with successful results. The other great pressure on a tunnel lining comes from the weight of the earth above it. To ascertain whether the concrete lining was as strong as cast iron, an experimental tunnel 8 ft. 6 in. in diameter was driven at Wood Lane, half of it formed of cast-iron rings, and half of concrete rings. The top of the tunnel was only 2 ft. 6 in. below the surface of the ground, so, to represent a greater depth, a stack of iron weighing 175 tons was built up immediately over it. Under this burden, the concrete proved to be just as capable of carrying weight as the cast iron. The same result followed when 228 tons of iron were piled on the top of a tunnel 12 ft. in diameter. These tests satisfied the engineers that concrete would make as good a lining as iron, but several problems of detail had still to be solved. Concrete segments had never been bolted together in this way before. A way had to be found of making the holes for the bolts so that the concrete would not crumble, and this was done by lining the holes with steel ferrules, and the concrete itself was strengthened by special local steel reinforcement.

In reinforcing the concrete segments double the customary proportion of steel rod has been used. The thickness of the skin of the reinforced concrete segments is 2 in., whereas that of the cast-iron segments is $\frac{7}{8}$ in., but because concrete is lighter than iron, the total weight is not increased. This is very important because the segments have to be man-handled and their weight must be such that they can be placed in position easily and quickly. Various ways of ensuring that the concrete is sound and compact have been considered, and the contractors who were asked to submit quotations for the segments were given as free a hand as possible so that the benefit of their practical experience might be reaped.

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High Speeds and Signalling

THE introduction during the last few years of high-speed train services has made it essential to consider how far existing signalling provides the necessary degree of safety, and particularly as regards the provision of sufficient warning for trains to be pulled up clear of an obstruction without undue discomfort to passengers. This affects the position, working, and reading of the distant signal, the key signal for the express driver in our ordinary two-position mechanical signal system operated under manual block principles. An adverse distant signal should afford a driver adequate distance in which to obey it, but whether this distance should be regarded as beginning at the signal itself, or in some portion of the approach during which the signal indication can be distinguished with certainty, is a controversial point. In earlier years sighting distance was in some measure necessarily included, signals being frequently made very high, with sky backgrounds to render them visible a long way off. To place distant signals at the long braking distances now said to be necessary, as the German State Railway has been doing on many routes, raises the operating disadvantage that the warning indication is received too soon by many classes of train, and this is felt particularly in poor weather when the stop signals ahead are not discernible as early as usual.

The problem is complicated by our having so many different types of train. That it is not easy to suggest a solution applicable to all circumstances was shown in the discussion on Mr. F. B. Egginton's paper before the Institution of Railway Signal Engineers on March 23, when many different suggestions were heard. The L.N.E.R. prescribes a full block section overlap for high-speed trains in block telegraph territory; while the G.W.R. has placed a certain number of distant signals, at about 10-mile intervals, at a sufficient distance out, and prohibits the signal boxes working them from clearing their signals until "line clear" has been obtained up to the next such location. In this way the driver travelling at very high speed cannot meet—unless, of course, some emergency arises—an adverse distant which does not afford him adequate space in which to stop at its home signal. The ordinary block telegraph certainly possesses the advantage of being flexible, and lending itself readily to such working, but there is with it always the risk of misunderstanding, everything depending on correct use of train description signals and the special rules. Moreover, a general increase in the number of high-speed trains would tend to complicate matters, so that it is difficult to think of such methods as anything but transitional. They could probably be dispensed with were a satisfactory means to be devised of repeating the present distant signals at some point in the rear, affording the high-speed train timely warning of the conditions ahead.

As to the form such additional signals should take there is at present no general agreement. Any form of semaphore compromise would seem to be accompanied by the risk of confusion with existing aspects; and there would be a similar risk of bewilderment in the use of a light-signal aspect conflicting with those seen in ordinary multiple-aspect areas, where the principles of the signalling are not the same as in block telegraph territory. With multiple-aspect equipment the speed-signalling principle and graduated restricting aspects leading to a stop indication could no doubt be made to cater for all classes of train without much difficulty, but we are faced in this country with long stretches of line on which it is unlikely that such signalling will be seen for many years yet, but where high-speed trains must be satisfactorily controlled. On the whole there is much to be said for a distinctive outer repeating distant, despite the objection to multiplication of signals. It has, however, been suggested that the new outer warning should be a cab signal applied only to high-speed trains, the existing signals remaining undisturbed. Drivers receiving it would be required to reduce speed at once. Should automatic train control or cab signalling become general, the addition of this facility would probably be comparatively easy. The aim should be to enable high speeds to be run at any time on adequate signal indications, without the necessity of special block telegraph instructions applicable to some trains only. The signal engineer cannot, however, solve the problem alone. He needs the active co-operation of his locomotive and operating colleagues.

POST OFFICES ON U.S.S.R. TRAINS.—The Soviet authorities are experimenting with a postal service for the convenience of passengers on long-distance trains. A travelling post-office official sells postage stamps, postcards, notepaper, envelopes, newspapers, and magazines, and also accepts for dispatch registered and express letters, telegrams, &c. The first post offices of this kind have been established on trains running between Moscow and Sochi, in the Caucasus.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

A German Turbine Locomotive

Fried. Krupp A.G.
Essen
March 17

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—We have read the remarks in your issue of February 4, 1938, under the heading "Turbine Locomotives," in which you record the statement of Mr. L. P. Michael, C.M.E. of the Chicago & North Western Railway, that "to his knowledge four turbine locomotives were in service, three in Sweden and one in England." We would point out, however, that the Krupp-Zoelly type turbine locomotive built by us has been running in regular express service on the Reichsbahn for some years. In 1934/1935 this engine was rebuilt as regards the auxiliary machinery and was fitted with an additional shunting turbine, for both directions of running, which could be cut in and out at will, instead of the original reverse turbine. These steps have resulted in the geared turbine locomotive being so much improved that it now fulfils all expectations. The results obtained with it on the Reichsbahn have been described by Dr. W. Bergmann, a Reichsbahndirektor, in *Verkehrstechnische Woche*. Dr. Bergmann wrote:—

"Initial difficulties rendered considerable constructional modifications to the turbine locomotive necessary (addition of a supplementary turbine, operation of auxiliary machinery by steam drawn from the main turbine), which have made the Krupp turbine locomotive a complete success. During trial runs at a steady speed of 80 km.p.h. (50 m.p.h.) the coal consumption was 27 per cent. less than with an '03' class locomotive.* In regular service where, in spite of the small heating surface and lower maximum speed, it performed the same work as an '01' class engine,* the saving in coal was always some 15 to 20 per cent. The excellent running properties of the engine are deserving of special mention; the accelerative capacity and ease of handling make the turbine locomotive appear peculiarly suitable to become the high-speed locomotive of the future."

As the foregoing extract shows, this condensing turbine engine with direct gear transmission gives a coal saving of 15 to 20 per cent. compared with the "01" standard Reichsbahn type performing the same service. It is to be noted that it is in this case a question of an experimental design, and that, as calculations for a newer one show, with the raising of the steam temperature and further improvement in the efficiency of the turbine, a saving of 35 per cent. is attainable.

Yours, &c.,
F. KRUPP

[* The "01" and "03" class locomotives of the German State Railway are standard Pacifics, the "01" being slightly heavier and more powerful than the "03".—ED. *R.G.*]

Old Papal Saloons

236, Ferme Park Road, N.8
March 22

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—My letter on the Evolution of Railways (published in your issue of February 4) in which I referred to an early train of the old Papal States, has brought me several inquiries, and it is possible that other readers might be interested in a brief note on the subject. The old States of the Church had two railways out of Rome, one to Civita Vecchia and the other to Frascati. It was this latter line which had the special Papal carriage mentioned in my letter. Carved outside the saloon was the Latin for "Go Through the Whole World," while inside was the text about the Chariot of Fire with Steeds and Reins of Flame. Under the Papal Arms was the further text quoted by Mr. Charles E. Lee: "Every Valley Shall Be Filled Up, and Every Mountain and Hill Brought Down. The Crooked Ways Shall Be Made Straight and the Rough Paths Made Smooth."

It was the Civita Vecchia line, however, that had the more famous Papal saloon mentioned in some of the railway histories, notably in Ernest Protheroe's "Railways of the World." This carriage, built in 1857 at a cost of £5,500, was rather unusually for that date mounted on bogies and was intended as the last word in luxury. It was divided into three compartments, an oratory and a robing room, and a throne room in which dignitaries could be received; in 1860 the Pope used this saloon for a sort of tour of his tiny kingdom, and there would no doubt be receptions at every station. Each throne-room panel was decorated by some famous artist, one painting showing the Pontiff blessing the railway; the oratory had a picture of the Immaculate Conception done especially by Millet. With the fall of the Papal States in 1870 the saloon lost its use and was stored in some siding-shed; even so, forty-one years later it was brought out and, though a little faded and shabby, was shown at the Rome Exhibition of 1911. It would be interesting if any reader of THE RAILWAY GAZETTE could supply details of the subsequent history of this venerable coach *de luxe* of eighty years ago.

Yours faithfully,
JOHN GIBBONS

Opportunity for a Fixed Easter

1, Regent Street, S.W.1
March 24

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—As the Orthodox and Protestant Church authorities have agreed to the League of Nations' recommendation that Easter Sunday should be located "on the Sunday following the Second Saturday in April," only the consent of the Holy See is wanted to decide Easter's future dates, from 1939. In 1939, Good Friday comes on its historic anniversary, April 7. Roman Catholic, Orthodox, and Protestant authorities agree upon that as the only date known in the life of Christ. That will also bring Easter Sunday and Whitsun Sunday on their historic dates, April 9 and May 28.

Those facts bring to the Holy See its opportunity to help all Christians by amending the 1,600 old moon-wandering Easter rule. The fixing of the date of Easter from 1939 would bring to your readers the benefits of more convenient holidays, constant school and college terms, equal periods for holiday savings, expenditures, &c. We therefore ask you kindly to exert your editorial influence to encourage the Holy See to decree the stabilised date for Easter from 1939. That help is the more important, because Good Friday in 1940 is Church-calendared to come on March 22, its earliest date, when the colder weather in Central and Northern Europe and North America would further spoil the Easter holidays, by holding back from workers two or three weeks' savings, which they could enjoy far better on the 1939 Easter based on April 9.

Yours sincerely,
MOSES B. COTSWORTH,
General Director,
International Fixed Calendar League

FOREIGN VISITORS TO GREAT BRITAIN.—The Travel & Industrial Development Association of Great Britain and Ireland announces that the holiday visitors to Great Britain during February of this year totalled 7,097, a decrease of 310 compared with the corresponding period of 1937. Business visitors totalled 9,882, a decrease of 19. Week-end and day visitors from France and Belgium are not included in these figures, nor overseas British visitors, estimated at an annual figure of 200,000, who are not recorded at the ports.

PUBLICATIONS RECEIVED

The Stock Exchange Official Year-Book, 1938. London: Thomas Skinner & Co., 330, Gresham House, Old Broad Street, E.C.2. 10¼ in. × 6¾ in. × 4 in. Pages i to ccxxxvi, and 1 to 3647. Price £3 net.—The fifth issue of this Year Book, which incorporates "The Stock Exchange Official Intelligence" and "The Stock Exchange Year-Book" in one compact volume, contains all the features for which investors have been accustomed to look and adds two new items, namely, a note on National Defence Contribution in the General Information section, and at the end of the book a list of British chartered companies. As in previous volumes, the front portion includes lists of members of the various Stock Exchanges of the United Kingdom, the chapter dealing with the finances of India which (owing to constitutional changes) has been considerably amended, the review of the year's legal decisions affecting companies, and the tables of statistics relating to the finances of the British counties and municipalities, the British Dominions and Colonies, and the sovereign states of the world. In the front portion are given the results to date of the working of railways in India and of the State-owned railways of other dominions and of the colonies, and also the rates per £1 at which foreign currency figures have been converted into sterling. The financial position of individual Indian railway companies and their contracts with the State are fully given under the heading "Indian Railways" in the main body of the work. Under the heading "Public Boards" will be found particulars of the London Passenger Transport Board and its pooling arrangements with the main-line companies, and of the Northern Ireland Road Transport Board. Details of the London Electric Transport Finance Corporation and of the Railway Finance Corporation appear under "Financial Trusts, Land, and Property."

Working results from 1928 to 1937 inclusive of the four principal British railway companies are given and also their investments in other transport undertakings. Railways wholly or partly in Northern Ireland are included in the section "Railways—Great Britain and Northern Ireland," and particulars of the Great Southern Railways Company appear under "Railways—Dominion and Colonial." The Foreign Railway section is fully representative and contains the latest available information as to schemes of arrangement, &c. Reference is made to the working of the Cordoba Central Railway by the Argentine State Railways, and to the transfer to the Central Uruguay Railway Company of its extension companies. Railway interests in each of the associated omnibus undertakings are set out in the "Tramways and Omnibus" section. Towards the end of the book is the supplement containing information received too late for classification. After the supplement are the usual particulars relating to stamp duties, trustee investments, income tax, &c., as well as the list of British statutory companies.

Associated British and Irish Railways: Travel Folders.—Five brightly designed and charmingly illustrated folders, recently issued for distribution from the U.S.A. and Canadian joint enquiry offices of the Associated British & Irish Railways, are certainly a tribute to the way in which our railways are being publicised in the North American continent. The titles of these brochures are: "This is England," in which Mr. S. P. B. Mais delights the eye of the discerning traveller; "The Romance of Scotland," thoughtfully compiled by Mr. Graham Sutton, which gives an alluring outline of the varied treasure of the land of the thistle; "Ireland—on the Road to Europe" from the resourceful pen of Mr. Stephen Gwynn, a booklet which will surely waken in Irish blood all over the States a desire to visit a land of so many memories. The fourth folder is "The Shakespeare Country," by Maxwell Fraser, F.R.G.S.—Shakespeare and George Washington are two of the most revered celebrities in the United States, and Stratford and Sulgrave the Mecca and Medina of all true citizens of that land; we do not compare Mr. Fraser's writings to those of the Koran, but they are at least a trustworthy guide for pilgrims to the Shakespeare country. The remaining publication, while primarily a railway map of Great Britain and Ireland, is also a useful "pocket information bureau" of tourist travel facilities, offered by the British and Irish railways.

C.N.R. Tours in Canada and U.S.A.—Canada can be visited this coming summer in a new way—by excursion tours, which are scheduled for certain periods in June and July. They form part of the Canadian National Railways programme of 25 different "all-expense" tours to Canada and the United States. The lowest-priced trip is one of £45, which covers third class on Atlantic liner and extends over 22 days. All these holidays last between 22 and 29 days, with the exception of a special escorted de luxe tour across the Dominion. This lasts for 45 days, the cost being £163 10s. tourist and £195 cabin class. Passengers embark at Liverpool or Southampton, and return in the R.M.S. *Queen Mary* from New York, having visited Quebec, Montreal, Ottawa, Toronto, and other North American cities, before reaching the mountains and Jasper National Park, the 4,200 square mile big game sanctuary and summer resort in the Rockies. From Jasper, the newest attraction is a motor drive over the recently-opened 75-mile long portion of the Jasper-Banff highway to the Columbia icefield. Niagara Falls, of course, is also included in the itinerary. The Canadian National tours are attractively presented in well illustrated booklets which should encourage visits to friends and relations in North America, especially as the prices of these tours are on an inclusive basis, so that the visitor finds his meals, hotels, sightseeing, and other travel needs provided for in advance.

University of Illinois Bulletins.—The following bulletins have been issued by the Engineering Experiment Station of the University of Illinois, Urbana:—

No. 2, Resistance to Heat Checking of Chilled Iron Car Wheels, and Strains Developed under Long-Continued Application of Brake Shoes. By Edward C. Schmidt and Herman J. Schrader. Price 55 cents.

No. 27, Solution of Electrical Networks by Successive Approximations. By Laurence L. Smith. Price 45 cents.

Unit Heaters.—The K.B. unit heaters described in this illustrated booklet from Keith Blackman Limited, 27, Farringdon Avenue, London, E.C.4, are designed to circulate warmed air in workshops, offices, and similar situations. In warm weather the heating (which may be supplied by steam, hot water, or electricity) can be cut off, and the units used simply to ventilate. All units are fitted with the company's Streamline fans, driven by a.c. or d.c. motor. Neatness and economy of space are features of the construction. For normal use, the heaters are provided on the delivery side with adjustable louvres for deflecting the air stream in the desired direction; where units have to be mounted at a considerable height, however, cowls can be fitted instead of louvres to ensure that the air is delivered downwards to floor level.

Power Station Batteries.—An illustrated booklet entitled "Battery Practice in the Modern Power Station" has been published by the Chloride Electrical Storage Co. Ltd., Exide Works, Clifton Junction, near Manchester. Power station batteries are usually installed to provide current for vital circuits in the station should the power supply fail; or even to help deal with excessive short-duration peak loads (either supplying the distribution mains direct, or, if alternating current is supplied, through a motor-generator set). A lighter duty is that of providing emergency lighting in the station or substation, when the batteries may be used in conjunction with Exide Keepalite switchgear, an automatic device which effects instantaneous changeover to the battery when the normal supply fails. Other battery applications at power stations are for switch tripping and indicating. The booklet discusses the appropriate types of battery for all such services, and concludes with a useful questionnaire which will enable power stations to formulate their requirements and use to the best advantage the technical advice which the Exide engineering staff is always ready to provide.

XUM

THE SCRAP HEAP

Centenary of the T.P.O.

One of the many interesting features in connection with the centenary celebrations of the travelling post office is the exhibition throughout this week in the shareholders' meeting room at Euston station of the film entitled "Night Mail," produced by the Post Office Film Unit. As a commentary to those scenes in the film when the Night Mail to Aberdeen is seen on its journey, Mr. W. H. Auden composed the following poem, which is recited in sections during the film—with a strong sense of rhythm—to accompany the variations in the sound of the train on different parts of its journey :—

NIGHT MAIL

This is the night mail crossing the border,
Bringing the cheque and the postal order,
Letters for the rich, letters for the poor,
The shop at the corner and the girl next door.
Pulling up Beattock, a steady climb—
The gradient's against her but she's on time.
Past cotton grass and moorland boulder,
Shovelling white steam over her shoulder,
Snorting noisily as she passes
Silent miles of wind-bent grasses ;
Birds turn their heads as she approaches,
Stare from the bushes at her blank-faced coaches ;
Sheep dogs cannot turn her course,
They slumber on with paws across.
In the farm she passes no one wakes,
But a jug in the bedroom gently shakes.
Dawn freshens, the climb is done.
Down towards Glasgow she descends
Towards the steam tugs, yelping down the glade of cranes
Towards the fields of apparatus, the furnaces
Set on the dark plain like gigantic chessmen.
All Scotland waits for her ;
In the dark glens, beside the pale-green sea lochs,
Men long for news.
Letters of thanks, letters from banks,
Letters of joy from the girl and boy,
Receipted bills and invitations
To inspect new stock or visit relations,
And applications for situations,
And timid lovers' declarations,
And gossip, gossip from all the nations,
News circumstantial, news financial,
Letters with holiday snaps to enlarge in
Letters with faces scrawled on the margin.
Letters from uncles, cousins and aunts,
Letters to Scotland from the South of France,
Letters of condolence to Highlands and Lowlands,
Notes from overseas to the Hebrides ;
Written on paper of every hue,
The pink, the violet, the white and the blue ;
The chatty, the catty, the boring, adoring,
The cold and official and the heart's outpouring,
Clever, stupid, short and long,
The typed and the printed and the spelt all wrong.
Thousands are still asleep
Dreaming of terrifying monsters
Or a friendly tea beside the band at Cranston's or Crawford's ;
Asleep in working Glasgow, asleep in well-set Edinburgh,
Asleep in Granite Aberdeen.
They continue their dreams
But shall wake soon and long for letters.
And none will hear the postman's knock
Without a quickening of the heart,
For who can bear to feel himself forgotten ?

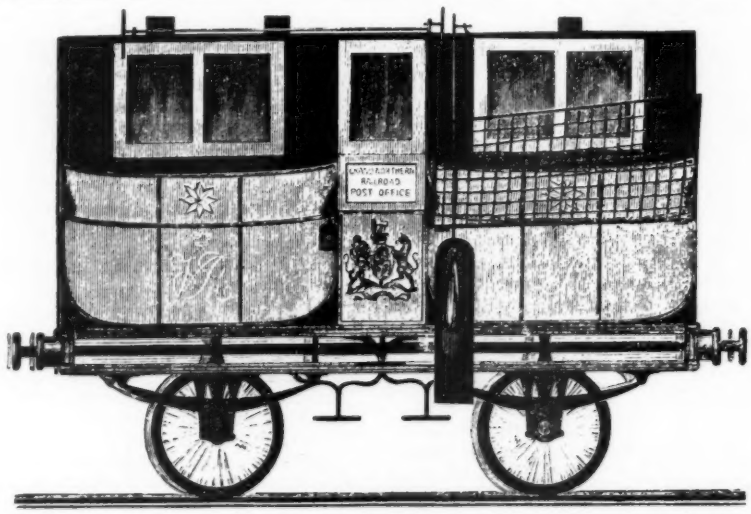
We reproduce a page from *The Literary World* of November 23, 1839, which gave what we believe to be the first illustrated description ever published of a travelling post office equipped for the exchange of mail bags at speed. The idea was really a development, adapted to the higher speeds of railway travel, of a common device in the days of mail coaches on the roads. It was then customary, at certain points where the mail was not normally heavy, for the postmaster to lean out of a first-floor window of a post office on the line of route, and with some dexterity to exchange bags with the mail guard while the four-horse coach dashed by at high speed.

The Literary World :

A JOURNAL OF POPULAR INFORMATION AND ENTERTAINMENT.

CONDUCTED BY JOHN TIMBS, ELEVEN YEARS EDITOR OF "THE MIRROR."

No. 35.] SATURDAY, NOVEMBER 23, 1839. [Price 2*d*.



TRAVELLING POST-OFFICE, ON THE LONDON AND BIRMINGHAM RAILWAY.

INTERIOR OF THE POST-OFFICE.

TRAVELLING POST-OFFICE,

ON THE LONDON AND BIRMINGHAM RAILWAY.

HERE is a specimen of that exhaustless ingenuity which bids fair to "annihilate time and space." That "time and tide tarry for no man," the dials have long since told us : but the improvement above illustrated, enables us to work double tides, to duplicate time, and to travel and work at the same instant.

The Cuts shew the exterior and interior of the Travelling Post-office, in which the mails are conveyed along the London and Birmingham Railway. This carriage is fitted internally with nests of "pigeon holes," drawers, desks, and pegs ; and is attended by one or more clerks and a guard ; the former to sort and arrange the

Facsimile (slightly reduced) of the first page of an illustrated article on the travelling post office with mail exchange apparatus, published in 1839

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

INDIA

Railway Budget Debate

As usual, the general discussion on the Railway Budget produced many and varied criticisms of the railway administration. The provision of first class air-conditioned coaches was characterised as an extravagance which was unjustified while the demand for reasonable amenities for lower-class passengers, who provided the bulk of the coaching revenues, remained unfulfilled. Sir Thomas Stewart's announcement that the North Western Railway would operate an experimental bus service between Lyallpur and Jhang in the Punjab was strongly criticised, some members maintaining that the only way to meet road competition was to make railway transport more attractive to travellers and traders.

Replying to the debate, Sir Thomas Stewart pointed out that, on the question of corruption among railway staff, the Chief Commissioner and Financial Commissioner of Railways recently interviewed 17 chambers of commerce, but not a single specific accusation in this respect was brought to their notice. The provision of electric fans in third and inter class carriages, so often demanded, would cost about Rs. 3½ crores (£2,625,000) besides a recurring expenditure of Rs. 40 lakhs (£300,000) annually.

Manufacture of Locomotives in India

The Assembly adopted a cut moved to emphasise the desirability of manufacturing locomotives in India. The mover considered that the Government figure of 200 as the minimum annual output necessary for the economic working a locomotive factory was excessive, and stressed the possibility of successful manufacture of locomotives with the Indian railways as a ready market. On behalf of the European group in the Assembly, it was maintained that the manufacture of locomotives in India should be examined as a commercial proposition and not as a matter of prestige. Private manufacture was impossible because of the small and fluctuating demand. Sir Thomas Stewart pointed out that the figures given by the mover differed from the estimates prepared by experts. According to official estimates, the probable average requirements up to 1955 would be 33 broad gauge and 29 metre gauge engines per annum; the average purchases during the last nine years were 27 broad and 33 metre gauge. For some time past a process of improving the economic utilisation of locomotives had been going on, and it was impossible to say that the Indian railways would buy anything like the number of locomotives that the mover had indicated. He pointed out that the policy of discriminating protection followed by the Government was approved by the Opposition, but the present demand was not a straight demand—that the railways should manufacture locomotives because it would be in their interest. It amounted to the introduction of a new fiscal theory and policy through a sidedoor.

The Government was defeated on a cut moved to protest against the absence of any Indians in the higher administrative posts on the railways, and again on another which sought to ventilate the poor quality and excessive charge of refreshments available to railway passengers. The guillotine was ultimately applied on February 24 and the rest of the demands passed.

BURMA

Bold Policy of Reorganisation

In compliance with the Pope Economy Committee's recommendations, an Organisation Department was formed on the Burma Railways in May, 1933, but remained in existence for a period of only 20 months, being dissolved at the end of December, 1934. During this period the cost of the special organisation was Rs. 65,181 and the total savings effected amounted to Rs. 2,20,790, of which Rs. 73,734 represented annual recurring expenditure. These figures, though they justified the formation of the special department, were by no means as good as those of the Indian railways as a whole, the probable reason being that the savings effected were the result of many petty economies, and because no bold reconstruction of the administrative or executive structure of the railway was attempted.

In view of the savings that had been effected, however, and influenced, no doubt, by the very definite views expressed in the Wedgwood Report as to the advisability of continuing such departments, the Burma Railway Board—newly constituted with effect from April 1, 1937, on the separation of Burma from India—decided very early in its existence to revive the Organisation Department, and consequently did so with effect from June 1, 1937.

The necessity for the adoption by the new department of a bolder policy than formerly followed was obvious from consideration of the following simple figures:—

Period	Gross earnings Lakhs of Rs.	Working expenses Lakhs of Rs.
Average war time...	250	115
Maxima during post-war boom ...	510	310
Minima during world-wide slump	350	270
Average for the last three years ...	380	260

The principal reason for the fall in gross earnings from over Rs. 5 crores to less than 4, is road competition; and, in spite of all efforts which may be made by the administration, it is extremely unlikely that the figure will ever again reach Rs. 4 crores, if indeed it exceeds the present average figure.

The administration therefore, faced with a probable permanent reduction of over 25 per cent. in gross earnings, and after most careful investigation by the Organisation Department in close collaboration with the heads of departments, decided that a trial should be given to a scheme for reducing the number of executive districts from six to five in the Engineering (Way and Works), and Traffic (Transportation) Departments and from four to three in the Locomotive, Carriage, and Wagon Department. The annual savings expected from the change are Rs. 88,600. The average size and activities of each district under the new scheme are tabulated below:—

Average per district after reorganisation	Department		
	Engineering	Locomotive	Traffic
1. Number of staff ...	1,487	1,169	874
2. Route-miles	374	687	374
3. Track-miles (including sidings)...	521	—	—
4. Train-miles per annum	—	2,425,000	1,323,000
5. No. of stations ...	—	—	83
6. No. of engines in service ...	—	105	—

ARGENTINA

State Railways' Agreement with French Company

The agreement for the utilisation by the State Railways of part of the lines of the Santa Fé Provincial (French) Railway [reported in these columns of our issue of March 25.—ED. *R.G.*] was considered by the Government to be preferable to the outright expropriation of the San Cristobal—Rafaela branch, or the construction of a new line from San Cristobal to Eusebia, which would have been prejudicial to the interests of the Santa Fé Railways, and would have created unnecessary competition in a zone already adequately served. The statement on the subject issued by the Ministry of Public Works declared that the transit charges to be paid for the use of the lines mentioned would be practically equivalent to the interest and amortisation charges on the capital required for building the proposed new branch line, exclusive of the actual traction expenses.

City of Buenos Aires Transport Co-ordination Scheme

Some 16 months after the passing by the Senate of the Bill for the co-ordination of the transport services of the City of Buenos Aires, referred to

in THE RAILWAY GAZETTE of October 10, 1936, the byelaws of the new corporation, as drawn up by the special commission appointed for the purpose, have been approved by the Government in the form of a Decree issued by the Ministry of the Interior. The details of the scheme—which is described by the *Review of the River Plate* as " vast and comprehensive, marking an epoch in the history of passenger transport not only in Argentina but the whole of South America " —are embodied in the Government Decree. This consists of a preamble and 12 articles treating, of (*a*) the capital of the corporation, with the shares allocated to the various surface and subway tramway companies and omnibus companies; (*b*) valuation and expropriation of the micro-buses; (*c*) exemption of the corporation from taxation; (*d*) contributions to the pension fund; (*e*) fares; (*f*) autonomous companies; (*g*) working hours of staff; (*h*) wages and holidays, &c. [An outline of the financial distribution and position of the corporation was given on page 283 in our issue of February 11 last.—ED. *R.G.*]

Under the terms of the Law, the different entities affected must intimate their acceptance of its provisions within two months.

Fresh Fruit Exports

At the annual general meetings of the shareholders of British-owned Argentine railways, the chairmen, particularly Lord St. Davids and Sir Follet Holt, have frequently referred to the increase in fruit cultivation as one of the few bright spots on the horizon. In this connection, it is worthy of note that the export of Argentine fresh fruit during 1937 amounted to 29,280 tons, an increase of 6 per cent. over the preceding year, the principal items being: pears, approximately 13,000 tons; grapes, 9,000 tons; apples, 5,600 tons; after which there is a drop to 700 tons in the case of grapefruit; the balance is made up by peaches, plums, melons, and quinces. The principal importing countries, in order of importance, were Brazil, U.S.A., Great Britain, France, Sweden, Austria, Germany, and Holland.

CANADA

Railways in 1936

According to the final report of the Dominion Bureau of Statistics at Ottawa, just issued, the gross revenues for the whole of the Canadian railways for the year 1936 amounted to $334,768,557, as compared with $310,107,155 in 1935, an increase of 8 per cent. Operating expenses increased by 7·4 per cent. to $263,942,899, and net operating revenues rose from $46,146,256 to $51,422,588. The tonnage of freight carried increased from 69,141,100 to 75,846,566 tons. The mileage of line operated at the end of 1936 was 42,552. The number of employees increased by 4·1 per cent. during the year, to 132,781, whilst the payroll was up by 5·6 per cent. to $182,638,365.

Traffic Tendencies in 1937

Traffics in the year 1937 showed an improvement in the aggregate, especially in certain branches of merchandise and minerals. During the eleven months ended November 30, 1937, the revenue freight totalled 75,693,162 tons, an increase of 6,586,919 tons during the year. Agricultural products declined by 3,332,685 tons to 12,537,679 tons. Animal products increased slightly by 53,721 tons to 2,250,490 tons, but there was a large increase of 4,299,019 tons in mine products, tonnage aggregating 28,819,898. The tonnage of forest products was 8,810,331, a gain of 1,529,748 tons, whilst " manufactures and miscellaneous " tonnage totalled 23,274,764, an increase of 4,037,116.

The International Limited

In a recent address to the Canadian Railroad Historical Association, Mr. H. C. Rochester, General Car Accountant, C.N.R., stated that the International Limited of his system, which had now been running for 37 years between Montreal, Toronto, and Chicago, had carried some 3,000,000 passengers and covered over 25,000,000 miles. He also said that this train was now worked mainly by Hudson type locomotives, the 334-mile run between Montreal and Toronto being accomplished without change of engines. The average mileage of these engines between general overhauls was now 250,000 miles, and five of them had covered 3,500,000 miles in the last seven years. The average loading of the International Limited was, he said, 12 to 14 cars, at the present day.

UNITED STATES

Financial Position in January

The Association of American Railroads reported on March 1, that Class I railroads had a net aggregate operating income of only $6,919,879 in January this year as compared with $38,889,878 in January, 1937, and $54,645,698 in January, 1930. This year's operating income in January was at the annual rate of return of 0·49 per cent. on property investment, as compared with 2·73 per cent. in January, 1937, and 3·81 per cent. in January, 1930.

Forecasts for President Roosevelt's Conversations

Enforced amalgamation of some of the railroad systems is one of the proposals to be submitted to the President when public and private groups confer with him shortly on the financial problems of the carriers in this country. Federal incorporation of railroads and co-ordination of traffic facilities have also been considered by some of those invited to the forthcoming White House conference. Moreover, recommendations have been drawn up by Mr. Wheeler, Chairman of the Senate Committee on Interstate Commerce, the Reconstruction Finance Corporation, the Interstate Commerce Commission, and some of the carriers themselves.

The President invited these groups as well as representatives of other Government agencies and the financial world to talk over with him a situation that has plunged one-third of the United States railroad mileage into bankruptcy and put nearly another third into serious financial difficulties. Some railway experts also offer plans for co-ordinating facilities to cut down overhead expenses and reduce traffic competition, but it is expected that the R.F.C., a major creditor of many of the systems, will concentrate on methods of refinancing insolvent or endangered lines.

Senator Wheeler predicted, in an interview, that the various suggestions advanced at President Roosevelt's conference would be embodied in a unified proposal to avoid Government management or ownership of the carriers.

TRINIDAD

New 2-8-0 Locomotives

The Government Railway is now taking delivery from the Montreal Locomotive Works Limited of two 2-8-0 type oil-burning locomotives. They are of standard gauge and are fitted with piston valves and eight-wheel tenders. The following are their leading dimensions :—

Cylinders	16 in. dia. by 24 in. stroke.
Coupled wheels, dia. ...	3 ft. 9 in.
Boiler pressure	200 lb. per sq. in.
Heating surface—	
Firebox	100 sq. ft.
Tubes	549 ,,
Flues	302 ,,
Superheater	243 ,,
Grate area	24·7 sq. ft.
Weight on coupled wheels...	49 tons.
Total weight, engine ...	56 tons 6 cwt.
,, ,, engine and tender ...	96 tons 4 cwt.
Tractive effort	23,200 lb.
Factor of adhesion	4·22.
Tender capacity—	
Water	3,000 gal.
Oil	1,100 ,,

AUSTRALIA

The Gauge Question

Among the distinguished visitors to Australia in connection with the 150th Anniversary celebrations, which began on January 26 last, were Lord Craigmyle, Chairman of the P. & O. shipping group, Sir Josiah Stamp, President and Chairman of Directors of the L.M.S.R. and Director of the Bank of England, and Mr. G. R. T. Taylor, Director of the L.M.S.R. Each of these visitors commented on the necessity for a uniform railway gauge.

At the present time there are three gauges in Australia: 4 ft. 8½ in. on the New South Wales and Commonwealth systems, 5 ft. 3 in. in Victoria and part

of South Australia, 3 ft 6 in. in Queensland, Western Australia, part of South Australia, and Tasmania. As the railways are owned and operated under separate administrations by the respective Commonwealth and State Governments, the question of conversion to a standard gauge is a matter for agreement between the various Governments. Some years ago a report was presented to a Premiers' Conference providing for a uniformity of gauge between the State capitals to be undertaken during a 10-year period at a total cost of £20 million (Australian). The proposal has never been proceeded with owing to the difficulty in reaching unanimity among the different Governments.

In view of the importance of the gauge problem so far as land defences of Australia are concerned, it is more than likely that the comments of these distinguished visitors will arouse renewed interest in authoritative circles in Australia. The text of the remarks by each of these visitors published in the Australian papers is quoted below:—

Lord Craigmyle: "If you could only have a uniform gauge, say 4 ft. 8½ in., throughout the Continent, I am sure it would be a great help to commerce in Australia. At first, of course, it would be to the disadvantage of shipping, but I think that in the long run it would be in the interests of shipping companies trading to Australia, because the prosperity of shipping to Australia depends on the prosperity of Australia. No doubt the provision of a uniform gauge would cost millions of pounds, but I can think of no better investment. Nothing is so calculated to hold up the progress of Australian industry as the continuation of the present system of varied gauges. I am looking forward to having a talk on the subject with Sir Josiah Stamp, who is at present in Australia and is one of my colleagues on the Board of the Bank of England."

Sir Josiah Stamp: "The problem of the different railway gauges in the various States is so obvious that it commands the attention of anyone coming from overseas. My personal view is that there are several aspects to be considered, defence, the psychological effect of emphasising State boundaries, and finance. Admittedly it would cost a large sum to bring about uniformity, but a beginning might be made by devoting the money now spent on renewals to the gradual extension of the standard gauge. Australia will be handicapped in her progress so long as domestic problems are affected by the conflicting interests of the individual States. A livelier Federal spirit seems to be needed and would no doubt develop as time went on."

Mr. G. R. Taylor: "The Trans-Australian express is an excellent train but the sooner a uniform gauge is adopted right through from Fremantle, the better it will be for Australia, and the sooner will freight costs be decreased. I consider that in Western Australia no new rolling stock for the 3 ft. 6 in. gauge main line should be obtained, but a 4 ft. 8½ in. gauge line should be started, and the 3 ft. 6 in. rolling stock absorbed on the narrower lines."

FRANCE

North Africa Exhibition Train

An exhibition train, known as the North Africa train, has been opened at the Gare de Lyon at Paris, to call attention to the products and attractions of the French possessions in North Africa. The train consists of six coaches: the first shows an old street in Algiers; the second is devoted to agricultural products, such as fruit, early vegetables, oil, &c.; the third and fourth to Moroccan products, namely dried rose petals, pomegranate skins, iris roots, cotton, hard wheat, fruit, and fish. The fifth coach is allotted to Tunisian industries, including carpet-weaving, cork, sponges, grain, phosphates, pottery, &c.; the background represents an Arab market.

After a few days at the Gare de Lyon, the train will proceed in turn to Montpellier, Nice, Grenoble, Chambéry, Besançon, Dijon, Ste. Etienne, Clermont-Ferrand, Limoges, Toulouse, Bourges, Nantes, and Le Mans, where it will be on exhibition. It has been organised on the initiative of the National Railways Company.

ITALY

The December Tiber Floods

The exceptional rise in the River Tiber began to affect the railways in the Rome district on December 14 last. Some 20,000 hectares (nearly 50,000 acres) of country were flooded between Orte, 77 km. (48 miles) north of Rome, and the sea, according to an account in the *Rivista Tecnica delle Ferrovie Italiane*. The lines most seriously affected were those around the Tiburtina station, Rome, and leading from Pontegalerie towards Magliana and Fiumicino. Lesser damage was also suffered between Rome and Orte and Pontegaleria and Maccarese, but did not upset railway working. The water covered the whole yard at the Tiburtina station on December 18, and when it reached 20 cm. (8 in.) above rail level multiple-unit electric trains were stopped, then certain electric locomotives, and since the operation of points was interfered with, goods trains also had to be held back and dealt with at suburban stations. Railcars were stopped when the water reached 60 cm. (2 ft.) above the rails, and at 75 cm. (2 ft. 6 in.) no type of electric locomotive could be used, but steam engines, with specially high grates were run as far as Monterotondo; the roadbed held up well despite the water becoming rough in a high wind. Boats were used to inspect the track and remove obstructions.

Until the water rose too high, a train was stationed on the Fiumicino line for passengers to walk through to reach their trains on the other side of the flood. On the Civitavecchia line some 4 km. (2½ miles) were submerged and single line working was put in force, it being thought safer not to use the track next the river bank. Eventually all traffic was suspended owing to the failure of an embankment. This was the only total interruption to traffic on a main line into Rome, and lasted until December 18. Special work had to be done at Pontegaleria and along the line to restrict damage, dams being built of any available material, and the various engineering works being watched to keep off harmful floating objects.

In view of the experiences in these floods, the Ministry of Public Works is investigating the levels of the various lines approaching Rome, with a view to possible improvement during the intended reorganisation of these lines.

POLAND

Annual Ski-Train Cruise

An interesting analysis of the nationalities of passengers who travelled on the Polish ski-train which in January made its seventh annual ten-day cruise of that country's winter resorts, revealed that nearly 70 per cent. were of other than Polish nationality. In all, representatives of 17 different countries were on the train including several members of the diplomatic corps accredited to Warsaw and the Baltic capitals. Extra improvements were made to the train this year by the addition of a dance car and a car with bathrooms and showerbaths, which were awarded high distinctions at the Paris Exhibition in 1937.

FAR EAST

China Development Companies

The Japanese Cabinet, on March 14, approved Bills creating two new semi-official corporations, the North and Central China Development Companies. The Bill for the former anticipates a capital of Y. 350,000,000 (about £20½ million), half of which is to be subscribed by the Japanese Government. Its headquarters will be in Tokyo, and [as already announced in our news columns—ED. *R.G.*] will be for the control of all transport, and electrical and mining industries in North China. The company will be empowered to issue debentures to the extent of five times the paid-up capital, and, until private shareholders' dividends reach 6 per cent., no dividend will be paid on the Government share of the capital.

The Central China Development Company will control similar activities in Central China, and also certain other industries and public undertakings. The proposed capital is Y. 100,000,000 (about £6 million) and the finances will resemble those of the sister company. Its headquarters will, however, be in Shanghai and not Tokyo.

XUM

BRITISH RAILWAY STATISTICS

"The Railway Gazette" monthly table for Dec., 1937, as compared with Dec., 1936, compiled from the Ministry of Transport Statement No. 217

Description	Great Britain*	G.W.R.	L.N.E.R.	L.M.S.R.	S.R.
PASSENGER TRAIN TRAFFIC—					
Number of pass. journeys (ex. season ticket holders)	108,638,891	7,467,700	14,943,385	23,322,277	18,757,556
Increase (+) or decrease (—)	— 364,543	— 301,615	— 327,941	— 984,119	+ 60,217
Passenger receipts (excluding season ticket holders)	£4,713,336	£680,807	£946,059	£1,401,070	£1,031,099
Increase (+) or decrease (—)	+ £250,691	+ £47,795	+ £43,537	+ £84,791	+ £53,303
Season ticket receipts	£782,963	£42,109	£123,131	£180,341	£295,402
Increase (+) or decrease (—)	+ £8,492	+ £405	— £2,904	+ £4,959	+ £5,578
Parcels and misc. traffic receipts (excluding parcels post)	£1,125,483	£207,293	£340,919	£431,007	£125,211
Increase (+) or decrease (—)	+ £19,348	+ £5,798	+ £20,890	— £2,101	— £3,180
FREIGHT TRAIN TRAFFIC—					
Freight traffic (tons) (excluding free-hauled)	24,415,123	5,747,476	10,924,456	11,598,311	1,296,317
Increase (+) or decrease (—)	+ 1,335,610	+ 469,035	+ 287,188	+ 751,329	+ 8,658
Net ton-miles (excluding free-hauled)	1,385,299,901	260,655,364	466,395,881	567,610,353	53,183,798
Increase (+) or decrease (—)	+ 49,072,301	+ 19,227,045	+ 9,365,701	+ 16,484,185	+ 2,716,105
Average length of haul (miles) (excluding free-hauled)	56·74	45·35	42·69	48·94	41·03
Increase (+) or decrease (—)	— 1·16	— 0·39	— 0·27	— 1·87	+ 1·84
Freight traffic receipts	£7,607,956	£1,224,040	£2,433,575	£3,322,000	£388,880
Increase (+) or decrease (—)	+ £509,347	+ £740	+ £176,375	+ £295,000	+ £19,228
Receipts per ton-mile	1·318d.	1·13d.	1·25d.	1·41d.	1·76d.
Increase (+) or decrease (—)	+ 0·043d.	— 0·09d.	+ 0·07d.	+ 0·09d.	—
Freight train-loads: Average train-load (tons)	134·00	142·41	137·42	132·45	104·23
Increase (+) or decrease (—)	+ 0·47	+ 2·94	— 2·78	+ 1·44	+ 0·27
Net ton-miles—					
Per train engine-hour	869·83	963·22	930·88	804·91	735·69
Increase (+) or decrease (—)	— 4·25	+ 15·57	— 52·08	+ 17·20	— 43·49
Per shunting-hour	875·73	820·14	967·81	888·74	565·22
Per total engine-hour	436·39	442·97	474·49	422·38	319·64
Net ton-miles per route-mile per working day	3,166	3,180	3,373	3,757	1,181
Increase (+) or decrease (—)	— 13	+ 122	— 77	— 26	— 7
Wagon-miles. Total	370,767,488	67,610,875	130,826,605	155,081,607	16,918,099
Increase (+) or decrease (—)	+ 5,167,552	+ 2,618,803	+ 3,443,500	+ 642,695	+ 118,416
Percentage of loaded to total	66·99	67·74	64·62	68·69	66·85
Wagons per train. Total	33·95	34·44	34·23	33·90	31·22
Increase (+) or decrease (—)	— 0·70	— 0·73	— 0·89	— 0·57	— 1·10
Loaded	22·74	23·33	22·12	23·29	20·87
Empty	11·21	11·11	12·11	10·61	10·35
Train-miles. Coaching—Per train-hour	14·94	13·95	14·08	14·05	17·78
Per engine-hour	11·95	11·00	10·78	10·77	14·93
Train-miles. Freight—Per train-hour	7·62	8·21	7·97	7·05	8·62
Per engine-hour	3·26	3·13	3·50	3·19	3·03
Engine-miles. Total	47,671,363	7,639,967	13,381,262	17,692,842	6,190,950
Increase (+) or decrease (—)	+ 1,438,692	+ 343,595	+ 589,209	+ 315,971	+ 285,415
Mileage run by engines. Total train-miles—					
Coaching	22,936,367	3,135,995	5,290,254	7,280,921	4,615,807
Freight	10,921,019	1,962,871	3,822,342	4,574,935	541,877
Engine-hours in traffic. Total	5,482,278	940,657	1,654,888	2,196,353	505,635
Increase (+) or decrease (—)	+ 170,725	+ 48,511	+ 95,423	+ 16,999	+ 20,966
Shunting miles per 100 train-miles—					
Coaching	7·58	7·31	6·84	8·09	8·12
Freight	75·99	86·36	69·58	73·09	95·25

Passenger Traffic Statistics: Number of journeys, receipts, and receipts per journey (excluding season ticket holders)—December, 1937

Subject	Great Britain	G.W.R.	L.N.E.R.	L.M.S.R.	S.R.	Cheshire Lines	Liverpool Overhead	L.P.T.B.†	Mersey
Full fares—									
Pass. journeys	37,636,967	710,678	1,216,979	1,466,536	3,122,523	14,012	189,034	29,955,732	96,664
Gross receipts	£965,712	£77,305	£123,736	£125,707	£210,161	£2,351	£1,977	£406,707	£1,675
Receipts per pass.	6·16d.	26·11d.	24·40d.	20·57d.	16·15d.	40·27d.	2·51d.	3·26d.	4·16d.
Reduced fares—									
Excursion and week-end—									
Pass. journeys	39,728,720	4,371,535	9,108,351	13,378,166	8,958,308	423,521	66,728	1,577,044	740,994
Gross receipts	£2,850,386	£473,175	£656,266	£1,016,256	£590,532	£25,830	£636	£34,786	£10,802
Receipts per pass. journey	17·22d.	25·98d.	17·29d.	18·23d.	15·82d.	14·64d.	2·29d.	5·29d.	3·50d.
Workmen—									
Pass. journeys	27,240,270	1,820,852	3,693,243	7,356,541	5,833,450	259,768	268,080	6,877,860	250,030
Gross receipts	£404,390	£27,376	£61,345	£120,718	£97,333	£4,435	£2,349	£77,861	£2,202
Receipts per pass. journey	3·56d.	3·61d.	3·99d.	3·94d.	4·00d.	4·10d.	2·10d.	2·72d.	2·11d.
Other—									
Pass. journeys	4,025,060	562,725	923,288	1,117,720	842,213	28,554	58,587	407,924	12,387
Gross receipts	£482,501	£100,504	£102,501	£133,790	£132,043	£3,203	£392	£3,543	£194
Receipts per pass. journey	28·77d.	42·86d.	26·64d.	28·73d.	37·63d.	26·92d.	1·61d.	2·08d.	3·76d.
Total—									
Pass. journeys	108,638,891	7,467,700	14,943,385	23,322,277	18,757,556	725,905	582,429	38,818,560	1,100,075
Gross receipts	£4,713,336	£680,807	£946,059	£1,401,070	£1,031,099	£35,859	£5,354	£522,897	£14,873
Receipts per pass.	10·41d.	21·88d.	15·19d.	14·42d.	13·19d.	11·86d.	2·21d.	3·23d.	3·24d.

* All standard gauge railways

† Includes passengers originating on the railway undertakings, and on the Whitechapel and Bow Joint Railway

SIGNALLING IN NETHERLAND INDIA

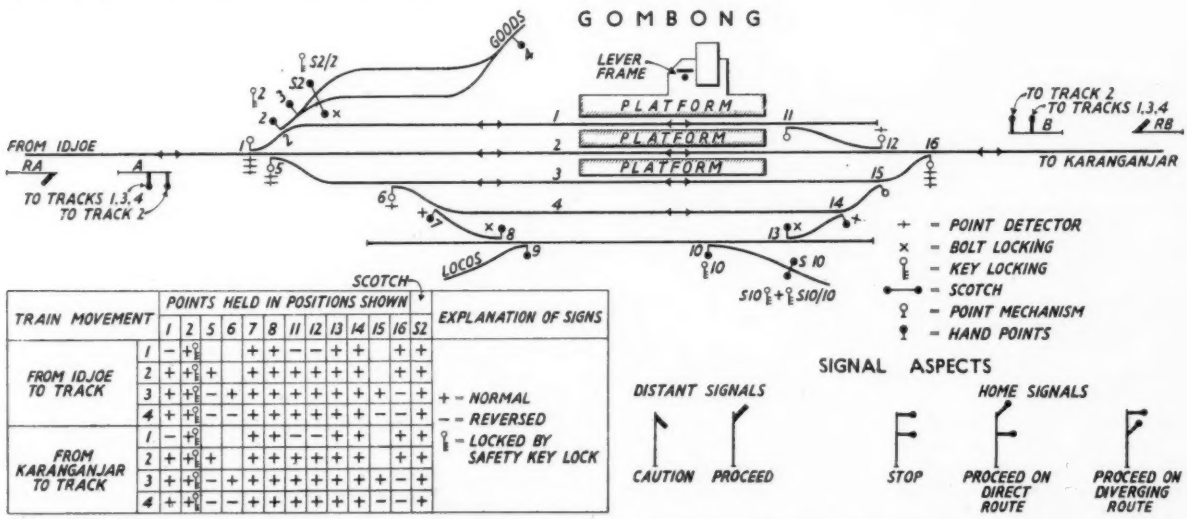
Improved installation at Gombong

FOR many years after the introduction of railways in Netherland India there was little or no signalling apparatus to be seen, and as the need for protecting stations against oncoming trains made itself felt, a primitive form of fixed signal was adopted and applied as an outer home at certain places. It consisted of a red disc moving through 90 deg. on a vertical spindle similar to the signals generally used in France, worked by a single wire transmission from a simple lever on the station platform and unconnected with the points, still operated locally by hand. This arrangement was later improved by inserting facing point detector slides in the wire so that the points were proved in the correct position before the disc could be pulled off, and held as long as the clear signal was exhibited. No attempt was made, other than by point indicators, to indicate direction to a train. A further improvement was therefore introduced in 1906, known, from the name of the first station fitted with it, as the Krian signal apparatus. This was also a single wire arrangement, but the outer disc signal was completed by the addition of an arm, indicating whether a train was to be received on a straight or a diverging route, so that the driver might regulate the speed accordingly.

This method of working was adopted at a good many single line stations, but the single wire transmissions were not found very satisfactory owing to difficulties arising from extremes of temperature, especially as the stations increased in size and the outer homes had to be worked at greater distances. In 1915, therefore, the double-wire system was introduced (it had already been standard for some years in the Netherlands) and has been gradually extended, giving much more dependable operation of the signals. At the same time the Krian disc and arm signal was replaced by a plain 2-arm, 2-position upper quadrant semaphore, the top arm reading for the straight route at the facing points and the bottom one for any diverging route. Later, distant signals were added to these semaphore outers. The double-wire operation of points was also introduced, at least for the principal points in the main and loop lines, with detectors and bolt locks, or key locking, for points still worked locally.

The signalling at the larger stations was for a time not as good as that at the single line loops. The attempt to apply the Krian system did not give much satisfaction, and eventually centrally-worked installations, on the lines of those seen in the Netherlands, were put in, with electric block apparatus on some sections. A sort of composite arrangement was introduced in 1909 at certain places, in which a system of route indicating, or directing, semaphores placed in the station was used to advise drivers passing the outer signal which line was prepared for them; but this system was not found to meet all the requirements.

The accompanying diagram is typical of the style of layout met with generally at loop stations and represents the installation at Gombong, until recently the last station on the Batavia-Soerabaia line in Java to be worked with the old Krian equipment. The working of the signals and most of the points is now effected from a lever frame of the Siemens and Halske type placed in the centre of the station; the less important points are operated by hand levers, bolt- or key-locked from the frame. The signals are semaphores, similar to those seen in the Netherlands, a very clear distinction between distant and stop signals when " on " being obtained, as the former incline downwards for normal and the latter stand horizontal. The " clear " position is the same for both, 45 deg. upward. The home signals, placed at some distance from the facing points, have two arms working on the American principle, the upper reading for the direct route, the lower applying to all others. There are, however, no starting signals. The locking chart shows the position of the various points for each train move, and is drawn on the method much favoured on the Continent. Although the station is at present manned throughout the twenty-four hours, the apparatus has been fitted with the special switch-out, or night key, device, by which the route can be set and locked at each end of the loops for the straight line, and then the home and distant signals for opposite directions cleared simultaneously. During closed hours it is impossible for an unauthorised person to interfere with this condition.



TRAIN MOVEMENT		POINTS HELD IN POSITIONS SHOWN													EXPLANATION OF SIGNS
		1	2	5	6	7	8	11	12	13	14	15	16	S2	
FROM IDJOE TO TRACK	1	−	+🔑			+	+	−	−	+	+		+	+	+ = NORMAL − = REVERSED 🔑 = LOCKED BY SAFETY KEY LOCK
	2	+	+🔑	+		+	+	+	+	+	+		+	+	
	3	+	+🔑	−	+	+	+	+	+	+	+	+	−	+	
	4	+	+🔑	−	−	+	+	+	+	+	+	−	−	+	
FROM KARANGANJAR TO TRACK	1	−	+🔑			+	+	−	−	+	+		+	+	
	2	+	+🔑	+		+	+	+	+	+	+		+	+	
	3	+	+🔑	−	+	+	+	+	+	+	+	+	−	+	
	4	+	+🔑	−	−	+	+	+	+	+	+	−	−	+	

Signalling and locking diagram, Gombong, Netherland India

CENTENARY OF THE TRAVELLING POST OFFICE

The evolution of the railway sorting carriage and mail exchange apparatus; and a description of the working of modern equipment for exchanging bags at high speed

SLOW speed, usually with horse traction, which sufficed for the early railways and tramroads, provided no inducement to the Post Office to divert its traffic from the roads, and it was not until the opening on September 15, 1830, of the Liverpool & Manchester Railway, that the question arose as to whether the new means of rapid transport could be used advantageously for the conveyance of mails. Arrangements were quickly made, the first rail-borne mail was carried between Liverpool and Manchester on November 11, 1830, and on May 9, 1831, a contract with the Postmaster-General was ordered to be sealed. This journey was too short to effect any widespread accelerations in mail-carrying, but with the completion of the Grand Junction Railway the advantages became considerable. Incidentally, when letters were first carried by rail in England, letter-stealing was a capital offence; the last man executed for that crime was hanged on February 13, 1832, and the death penalty was abolished in 1835.

In anticipation of the opening of the Grand Junction line on July 4, 1837, the Post Office dispatched a mail from London on the night of July 3, which was taken to Birmingham by road coach and thence to Liverpool and Manchester by rail. The journey was completed in the unprecedented time of 16½ hours, and the service immediately became popular. At the annual general meeting of the Grand Junction Railway in September, 1837, the directors made a special comment that Liverpool and Manchester had been brought within a night's post of London, "an advantage in which not only the places bordering upon the railway have participated, but others lying considerably wide of, and beyond it; the extent of which accommodation will be best appreciated by the fact that no fewer than about 740 mail bags are taken up and set down every day at the several stations on the railway." It was added that much credit was due to the Post Office authorities for the prompt and efficient manner in which they had adapted their system to the new order of things.

The First T.P.O. with Mail Exchange Apparatus

Within the next few weeks this promptitude was further demonstrated by the establishment of a travelling post office, the idea of which was first suggested by Frederick Karstadt, son of one of the Post Office Surveyors. As an experiment a horse box was fitted up temporarily as a sorting carriage and run between Birmingham and Liverpool, for the first time on January 6, 1838. The experiment was considered so successful that on June 19 of the same year it was decided to make the travelling post office a permanent institution. Accordingly, the first sorting carriage to be constructed specially for that purpose was built by the Grand Junction Railway Company. It was constructed by Nathaniel Worsdell, of the Grand Junction Railway, who had helped his father to make the tender for the *Rocket* in 1829. This vehicle, which was about 16 ft. long, 7 ft. 6 in. wide, and weighed just over 4 tons, had the further distinction of being equipped with apparatus for exchanging mail bags at speed.

The appliance was devised as early as May, 1838, by John Ramsay, an officer of the Missing Letter Branch, who was rewarded for his ingenuity by being appointed Post Office Inspector General. In February, 1839, the apparatus was reported to be "perfectly efficient," but between April 1 and May 11 there were eight failures in working, and Karstadt, who headed his reports "Grand Northern Railway Post Office," complained of "tarpawlings" on wagons in the front of the train knocking the bags off the post before the T.P.O. reached them. Although improved in 1848 by John Dicker, an Inspector of Mail Coaches, who received a grant of £500 from the Treasury for his ideas, the apparatus designed by Ramsay is substantially that in use at the present time.

The first T.P.O. from London ran from Euston to a point a little north of Bletchley, where the coach road—Watling Street—crosses the railway. The completion of the London & Birmingham Railway on September 17, 1838, linked London, Birmingham, Liverpool, and Manchester by rail, and the opening on October 21 of the same year of the North Union Railway enabled the London and Preston travelling post office to be established. This still remains one of the main trunk line services, though now extended to Aberdeen, and handling a vastly greater quantity of mail than the modest 51 "down" and 44 "up" bags which constituted the make-up of the London—Preston T.P.O. in 1843. A further T.P.O. was inaugurated between Rugby and Newcastle-on-Tyne in May, 1845, and was followed by others between Exeter and Bristol, Gloucester and Tamworth, and Chester and Holyhead, the last of which began in March, 1852. On April 25, 1860, a sorting carriage was introduced between London and Dover for sorting mails to and from the Continent; this service now runs between London and Newhaven.

Sir Rowland Hill and Railways

Sir Rowland Hill issued the first public edition of his pamphlet on "Post Office Reform" in February, 1837, and, as is well known, his agitation resulted in the introduction of the penny post, using adhesive stamps for prepaid postage. On December 9, 1846, he was appointed Secretary to the Postmaster-General, to act as adviser in carrying out postal reforms which he advocated, and from April 22, 1854, until his resignation on March 12, 1864, held the office of Secretary to the Post Office. What is not so generally known is that some of Sir Rowland's best administrative work during his eighteen years of office was in the expediting of mail-carrying by the extensive and judicious use of railway facilities. For this he possessed a special qualification in the form of practical railway knowledge gained as a director and a successful chairman of the London & Brighton Railway Company. He was a member of the first board of directors of the L.B. & S.C.R., and as such attended its first meeting on August 3, 1846, but forsook railway work in order to further his great and successful plans for the postal service.

From these early days the services rapidly extended, with numerous alterations in routes from time to time, until the whole of Great Britain is now covered by a network of some 70 T.P.O.'s; there are also four T.P.O. services in Northern Ireland. The accompanying sketch map shows the routes, and the schedules are so timed that it is possible to travel all the way by T.P.O. from Plymouth to Helmsdale with an interval of only a few minutes when connecting at Bristol, Birmingham, Crewe, and Perth. Almost every main line of railway in Great Britain has a night mail T.P.O. over the whole or the greater part of its length, and there are also several

day mail T.P.O.s. Approximately 160 specially-constructed carriages are used, of which about 90 are fitted with apparatus for exchanging mail bags with the 116 apparatus stations at present working in Great Britain.

Special Mail Trains

An important feature in the acceleration of mail conveyance by railway was the introduction of the special mail train devoted entirely to this service. Despite much-repeated statements to the contrary, the pioneer in this field was the G.W.R., which had established a night mail train on February 4, 1840, and for which four sorting carriages were ordered in July, 1841. Complaints of the irregularity of the postal service throughout the kingdom culminated in 1854 in an inquiry by a House of Commons Committee, with the result, so far as the G.W.R. was concerned, that Sir Rowland Hill arranged for special trains to be run between London and Bristol from February 1, 1855, exclusively for the use of the Post Office. The train was a very light one, consisting usually of two sorting carriages and a van, worked by one of the old 7-ft. singles. Eleven years later apparatus was installed at Slough and Maidenhead for picking up and delivering bags without stopping, and in June, 1869, the train ceased to be a "special mail" when the Post Office was persuaded to allow one first class coach to be attached.

Routes covered by the 74 travelling post offices of Great Britain and Northern Ireland.

Probably in view of this, it has usually been overlooked by historians and pioneer credit given to the famous "special mail" inaugurated on July 1, 1885, between London and Aberdeen over the L.N.W. and Caledonian Railways. This was really a development of the "limited mail" train introduced for the Scottish Night Mail on February 1, 1859, which included three sorting carriages and three mail tenders as well as limited passenger accommodation. For the "special mail" of 1885 the vehicles were all built with connecting covered gangways; the doorways were sufficiently wide to allow of the transfer of parcels post receptacles. This famous express, often nicknamed the "West Coast Postal," has now grown to considerable dimensions, a formation of fourteen bogie vans being customary, some six of which are sorting tenders fitted with exchange apparatus. The Up has a maximum of 13 vehicles, and the Down 14. Officially the trains are known as the Down Special T.P.O. (London to Aberdeen) and the Up Special T.P.O. (Aberdeen to London), and these are the largest T.P.O. trains in the world devoted entirely to Post Office business. The working of these trains was fully described by Mr. J. J. C. Rowden, Assistant Controller, Travelling Post Offices, G.P.O., in a paper he gave to the Railway Students' Association in London on December 3, 1936. This paper was published in our issues of December 11 and 18 of that year.

Sorting Carriages

T.P.O. sorting carriages and stowage vans vary in length from 42 ft. to 70 ft., but most of them can conveniently be classified according to length, as 50-ft. or 60-ft. vehicles. The railway company concerned, under its mail contract with the Post Office, undertakes the construction, maintenance, and replacement of all sorting carriages, and provides the stowage vans, which are used for the conveyance of mails not due to be opened in the T.P.O. and, to some extent, of mails made up in the T.P.O. That such arrangements are no novelty is shown by the fact that in 1839 the price for conveying the mails on the London & Birmingham Railway—settled by arbitration—included the provision by the railway of the Post Office carriages, and the transport of a guard and two clerks.

Sorting carriages and stowage vans are fitted at both ends with gangways to give through access to the staff. One side of a sorting carriage is occupied by pigeon-hole sorting fittings, and separate groups of pigeon holes, of appropriate sizes, are used (*a*) for registered letters, (*b*) for small letters, and (*c*) for long letters, newspapers, and packets. On the other side of the carriage are rows of iron pegs (for suspending the mail bags into which the sorted correspondence is placed according to destination); the apparatus fittings; and other necessary equipment.

The sorting tables are covered with green baize or lino, and the fronts of shelves, tables, and peg-rails with horsehair padding, so as to protect the staff from contact with hard surfaces. All carriages are steam-heated, electric lighting is general, and electric urns are installed for tea-making. Lavatories, and in some cases wardrobe cupboards, are fitted. An interesting contrast to these modern amenities is provided by the description of Francis Wishaw in 1840, after he had travelled in one of the London & Birmingham T.P.O.'s. He then said that "the whole system of sorting, leaving, and collecting the letters appeared susceptible of very little improvement," but added that "one thing forcibly struck us, namely, the necessity of warming the carriage, which, during the winter months, is miserably cold."

The feature of T.P.O. working which arouses the greatest public interest is, perhaps, the despatch and receipt of mails while travelling at full speed by means

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of apparatus fitted to the sides of the carriages and complementary apparatus erected at the side of the railway line. As already mentioned, this apparatus—like the T.P.O. itself—reaches its centenary during the present year, and the following notes explain the working of the modern appliances.

Lineside Apparatus

The lineside despatching apparatus consists of a cast iron standard with a movable top that can be rotated on a spindle. This top, the extreme height of which is about 10 ft. 3 in. above the rail level, has either one or two arms fitted to it, with spring catches, from which a leather envelope, or "pouch," containing the mail bags is suspended. The standard is provided with a ladder and small wooden platform to enable the messenger to suspend the pouch and manipulate the mechanism. The detachment of the suspended pouches from the standard by the passing mail train is effected by the contact of a "V" shaped rope on the carriage net with the main straps of the pouches, the latter being withdrawn from the spring catches by the forward movement of the train, and falling into the carriage net and thence into the carriage after being released from the standard.

The weight of a single pouch, including that of the bags which it protects, must not exceed 60 lb.; but two pouches can be received from a standard fitted with two arms. Three pouches can be suspended together on a dual fitting comprising a standard with a single arm placed in close proximity to one with two arms, one wooden platform serving for the two standards. At stations where the weight of the mails to be transferred to the mail train is beyond the capacity of a dual standard, additional standards are provided, and it is practicable, by this means, to suspend as many as nine pouches for collection by the mail train at one operation. In order that the carriage net, which partly closes at each receipt of pouches, may regain its fully extended position, the sets of dual standards must be placed not less than 70 yd. apart.

The lineside receiving apparatus consists of a net, about 8 ft. in length and 4 ft. in width, made of stout manilla rope attached to a framing consisting of railway sleepers fixed vertically in the ground, and a hinged iron frame. The height of both frames is about 4 ft. above the rail level, and the iron frame, when in its working position, is kept apart from the sleeper frame by an iron cross-bar. In front of this bar, and between the frames, a flexible steel wire cable is stretched. The cable is adjusted to engage the suspension strap of the pouch attached to the delivery arm of the carriage, and the impact causes the spring lid of the arm to open, thus releasing the pouch at the entrance to the net. The impetus imparted to the pouch by the progress of the train carries it beneath the detaching cable and the cross-bar into the net, where the concussion is reduced by the resilience of the ropework.

Every apparatus station is provided with a wooden shelter hut, 5 ft. square, and about 8 ft. high, fixed at the side of the railway and within a few yards of the apparatus. The hut affords storage for empty pouches, spare fittings and material, and serves to protect the messenger while he awaits the arrival of the mail train.

The point at which the carriage apparatus should be brought into operation is generally indicated by a lineside landmark, as, for instance, a bridge over the railway, a wall, or a viaduct; but where no feature of a suitable nature is available for this purpose a signal board, 9 ft. × 3 ft., painted white, is fixed at the side of the railway as a guide to the operators in the mail trains. Where the apparatus stands between two sets of lines, however, the operating point is denoted by a board, 12 ft. long and 1 ft. wide, placed a few feet above rail level. These boards are faced with white enamelled iron plates to make them readily observable by the train operators.

Carriage Apparatus

The mail carriage apparatus for the receipt of pouches from the lineside standards consists of an exterior net, the iron frame of which is hinged horizontally in the centre, and divided by the hinges into two rectangular pieces called, respectively, the bed, and the wing. The lower edge of the bed of the frame is pivoted to a strongly bolted iron plate secured to the underframing of the carriage at floor level. When extended for use, the net is 2 ft. 7 in. from the outside panel of the carriage, and the highest point of the wing stands 9 ft. 7 in. above the rail. This net is lowered into position, and raised again, by the action of a long lever inside the carriage.

When the net is not in use, it lies flat, or nearly so, against the side of the carriage. The spaces between the iron bars of the frame are filled with hemp netting (3-in. mesh), and stout manilla ropes are threaded through the netting at intervals to reinforce it. The rear end of the network is further strengthened at the upper end by iron chains to withstand the impact of the incoming pouches. The impact causes the net frame to close partly towards the carriage, and the pouches roll from the net on to a mat on the floor of the carriage. The weight of the iron frame (nearly 3 cwt.) suffices to restore the net to its fully opened position in less than two seconds, thus permitting the use of additional roadside standards in rapid succession.

The delivery of pouches from the mail train to the lineside receiving net is accomplished by means of shaped iron bars, called delivery arms, which bear box-shaped headpieces of malleable iron fitted with spring lids, or covers. These arms are hinged at the lower end, and on a level with the floor, to strong vertical iron tubes containing spiral springs which actuate the arms. The tubes are pivoted, at both ends, on iron brackets secured to the specially strengthened door pillars.

The delivery arms, two of which are mounted at each doorway used for apparatus working, are capable of being rotated through an arc of about 150 deg., so that the heads may be drawn into the carriage for the purpose of attaching the pouches. When not in use, the arms rest vertically against the outside of the doorway, being retained in an upright position by the tension of the springs within the tubes. When, however, the arm is turned outwards, bearing a pouch held by a clip at its head, the weight of the pouch causes the arm to assume a horizontal position, and the extended pouch consequently hangs clear of the carriage and about a foot or so above the ground at the side of the track. Immediately after the pouch is removed from the arm by the detaching cable of the roadside net, the arm, relieved of its load, is brought by the spring, automatically, to the vertical, or out of the working position. The weight of a pouch, together with its contents, for despatch from a carriage delivery arm must not exceed 60 lb.; but as many as twenty pouches can be delivered from a mail train at one working into a roadside net of the largest size.

Correspondence for transfer by apparatus is enclosed in canvas mail bags of special pattern. The bottom of the apparatus bag is constructed without corners, and is so shaped as to fit conveniently the folds of the pouch in which it has to be packed. The bag is marked with a black line to denote the safe limit of the contents enclosed

in it, as a loosely filled bag is less liable than a fully packed one to burst under the concussion of apparatus exchange.

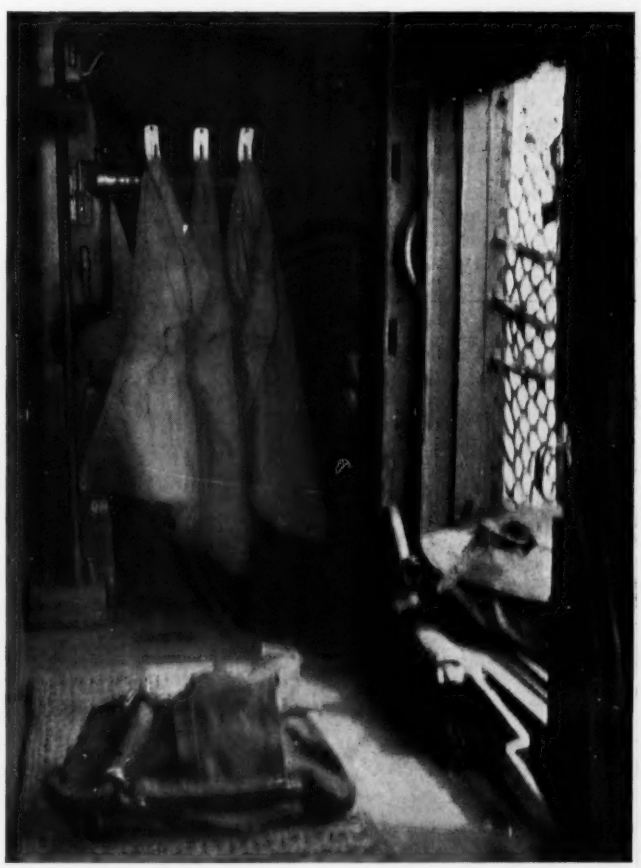
Apparatus Working

The lineside apparatus working is performed by postmen, mail van drivers, and others, who are required to pass a test with regard to their physical fitness for the duty, which demands both nerve and strength. On arrival at the apparatus station the attendant obtains the necessary leather envelopes from the hut, wherein they have been stored since the previous exchange, and prepares the pouches for despatch to the mail train. These pouches are thereupon suspended from the spring clips of the lineside standards, and retained in the out-of-working position until the approximate time of the passing of the mail train.

Where a telephone is provided in the apparatus hut, the attendant consults the signalman regarding the running of the train, and awaits his intimation that the mail train is approaching. On receipt of the warning, the attendant turns the suspended

Delivering a pouch at 70 m.p.h. The pouch weighs 20 lb. and its load is restricted to 40 lb. so that the total does not exceed 60 lb.

A pouch about to enter the net of the passing train. The pouch from the train has been caught in the lower net



Arrival of pouch inside the T.P.O. The angle of the net is arranged to minimise force of impact between pouch and carriage floor

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Exterior of modern L.M.S.R. travelling post office with pick-up apparatus

pouches to the working position, and raises the movable frame of the lineside net. This latter action opens the net, which is then ready for the receipt of pouches from the train. Where communication with the local signalman is not practicable, the pouches are withheld from the working position until 5 min. before the train is due.

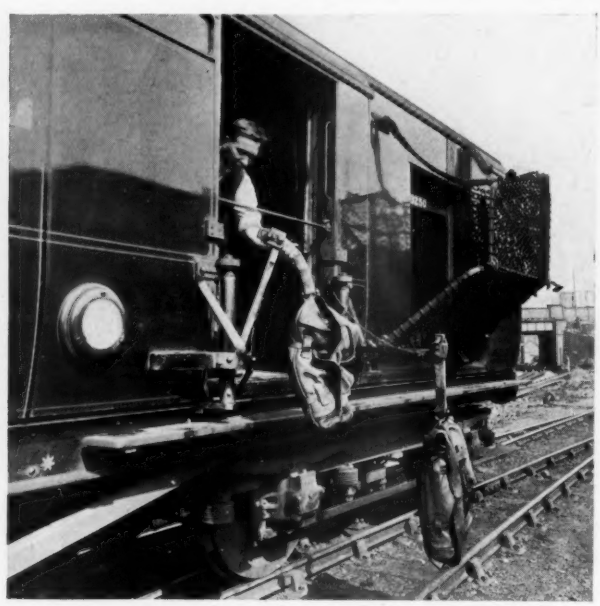
The actual exchange of mails is practically instantaneous, the pouches from the mail train being detached from the carriage arms a moment before the carriage net enfolds and removes the pouches hanging from the lineside standards. At a fairly high speed of the train, the exchange takes place in less than a quarter of a second. After the train has passed, the delivered pouches are withdrawn from the lineside net and opened, the standard turned to the non-working position, the net closed, and the hut locked, and the attendant conveys the bags to the local Post Office.

In the mail train, the trained operators, who note their position throughout the journey almost entirely by sound, particularly at night, prepare the pouches for delivery from the train and place them at the doorways at which delivery arms are fitted. When within a mile or so of the point of despatch, the doors, which slide into casements parallel with the side of the carriage, are opened, and the arms turned inwards to enable the operator to affix to the spring clips the main straps of the pouches, one at each side of the doorway. These pouches rest on the sill of the doorway until the appointed landmark, or signal board, is observed, whereupon the carriage net is opened out, and the delivery arms are swung outwards to their fully extended position with the pouches hanging ready for despatch. It is necessary that these operations should be performed quickly, in order to reduce to a minimum the time during which the movable parts of the carriage apparatus project beyond the sides of the carriage. As a rule, the complete operation, including the opening of the carriage net, the extension of the outgoing pouches from the train, and the exchange of pouches with the lineside station, is accomplished in 12 sec., or less.

Safety Precautions

Apparatus working, although to a great extent performed at night time and, frequently, under the most

T.P.O. staff on the night Irish Mail



Mail exchange apparatus

trying climatic conditions, is rarely associated with personal injury. The equipment is maintained at a high standard of mechanical efficiency, and many precautions are taken to ensure the safety of the postal and railway officials concerned, as well as that of the travelling public. Wherever possible, special approaches are provided to the sites at the side of the railway, bridges, banks, culverts, &c., being utilised for the purpose to enable attendants to obtain access to the apparatus without crossing the lines. Where this is not practicable a timber footway is laid across the lines. The lineside machinery can be manipulated at a safe distance from passing trains.

The postal officials in the train run little, if any, risk as their work is performed inside the carriage. For the protection of operators and others standing at, or passing the apparatus doorway while the latter is open for the delivery of pouches, a stout steel bar, which locks automatically across the doorway, is provided. An electric bell which continues ringing as long as the carriage net is extended gives warning to mail train officers to keep clear of the apparatus net door.

Railwaymen employed on the trains are familiar with the position and use of the apparatus, and they are accustomed to keep a look-out for suspended pouches at apparatus stations when they pass *en route*. During the day-time these stations are easily seen as the train approaches. At night-time, however, the pouches are not visible at a distance, and, as a safeguard to the enginemen and others working on the trains, every lineside standard from which pouches have to be suspended in darkness is provided with a white warning light visible only from the direction of approaching trains. The light, which is controlled by the lineside attendant, indicates that pouches are hanging. As an additional safeguard, telephonic or signal bell communication is provided between the attendants' shelter huts and the neighbouring signal boxes on the busier sections of the railway lines. By this means the signalman is enabled to notify the lineside attendant of the near approach of the mail train, and the pouches awaiting transfer are withheld until the latest possible moment, thereby avoiding any risk of contact with other passing trains.

The first T.P.O. of the old North Eastern Railway

Major G. C. Tryon (Postmaster-General), Sir Josiah Stamp (Chairman of the L.M.S.R.), and Sir Harry Twyford (Lord Mayor of London), chatting to sorters dressed in period costumes on a facsimile of an 1838 sorting carriage at the T.P.O. centenary exhibition at Euston which was opened on Monday (*see page* 675)

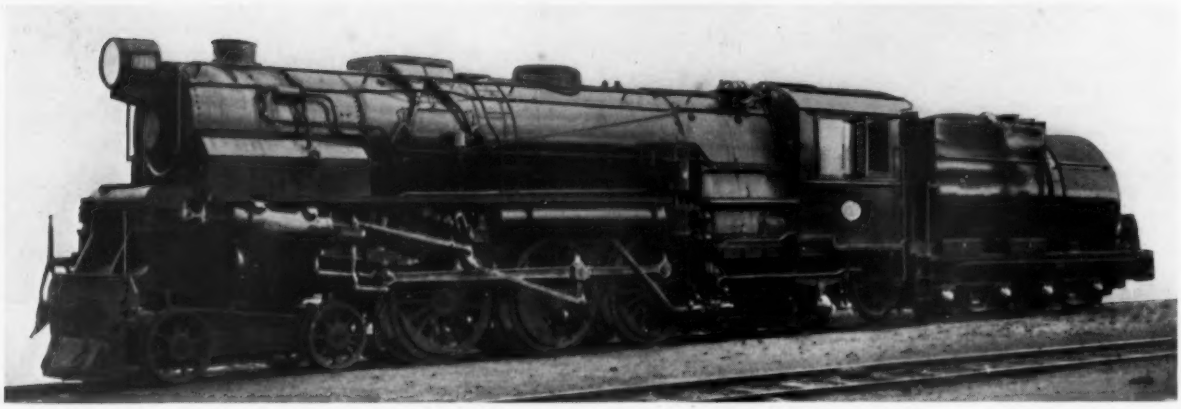
The pouches suspended from a lineside standard in the out-of-working position are too far from the line to involve any risk of accident to passing trains; hence no danger arises until the pouches have been turned towards the line in readiness for transfer. On many lines in Great Britain a notice is displayed in the carriage warning passengers of the danger of leaning out of the window. The carriage apparatus is never allowed to be in its working position when passing through a railway station. There is consequently no risk of accident to persons on the station premises. A clear space is necessary at the side of the railway, throughout the section to be traversed while the apparatus is in the working position, and the lineside apparatus has to be fixed at a distance of not less than 300 yd. from a station platform. The delivery of mails from the train presents no danger to passengers or railway servants travelling in the mail train, as the pouches for delivery are suspended below the floor level of the carriage. The highest point of the roadside receiving net is also below that level.

During the current week the centenary of the travelling post office is being celebrated by an exhibition at Euston station (see pages 675 and 649).

XUM

NEW PACIFIC LOCOMOTIVES IN NEW ZEALAND

Details of the "G" class general purposes engines for this 3-ft. 6-in. gauge system



THE first of the six "G" class Pacific type locomotives, referred to in our issue of November 12 last, has been completed at Hillside (Dunedin) workshops, New Zealand, and put into service on the Christchurch—Arthur's Pass section. We are now able to supplement the particulars given on page 822 of our issue of November 12 last.

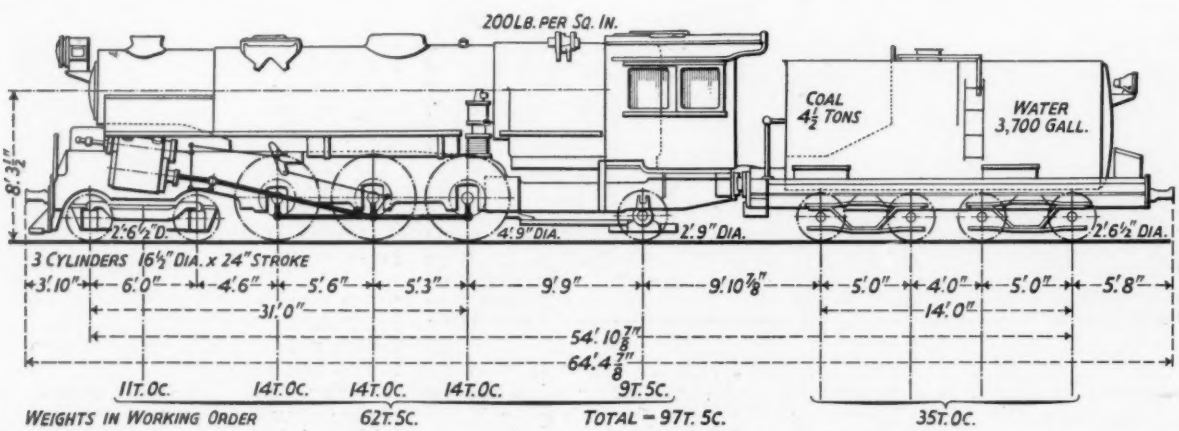
The engines have been constructed to some extent from parts taken from the three Garratt locomotives formerly in service in the North Island; the parts used from these Garratts consist mainly of the engine frames, driving and bogie wheels, valve motion, pistons with rods and crossheads, coupling and connecting rods, outside cylinders, coupled wheel spring gear, and certain of the brake parts and steam fittings. The remainder of the engine comprising boiler, smokebox, footplates, cabs, trailing bogie, and complete tender, are entirely new, as also is the inside cylinder.

It will be remembered that these engines have three high pressure cylinders and Walschaerts valve gear; the valve for the inside cylinder is operated by Gresley combining levers, driven from the outside valve stems. The valve gear is of the limited cut-off design, the maximum normal cut-off in full gear being 50 per cent.; small by-pass ports are, however, provided to give an increased cut-off of 75 per cent. for starting purposes.

Roller Bearings and Grease Lubrication

The axleboxes of the leading bogie and trailing engine wheels and also the tender bogies, are fitted with S.K.F. roller bearings lubricated with soft grease; the main driving wheels have axleboxes with ordinary bronze bushings, and are lubricated with hard grease by means of Franklin lubricators. The connecting and coupling rods, the big end bushes of which are of the floating type, are fitted with bronze bushings lubricated by hard grease. The spring gear is fully compensated from the leading pair of coupled wheel springs through to the trailing truck springs. This truck is of the Hodges type.

The boiler is very similar to the "Ab" type, the barrel being identical including the tubes, elements, and superheater, but the firebox is longer and deeper. The ashpan is fited with double hoppers with air-operated dumping doors. A Davies & Metcalfe exhaust steam



Dimensioned diagram of one of the new Pacific locomotives for New Zealand

injector is provided, and also a Sellers injector, both fitted on the left-hand side of the cab.

The following are the principal dimensions:—

Cylinders (3), dia.	16½ in.
Piston stroke	24 ib.
Wheels, coupled, dia.	4 ft. 9 in.
Boiler, heating surface :	
Firebox	151 sq. ft.
Tubes and flues	1,024 ,,
Total (evaporative)	1,175 ,,
Superheater	183 ,,
Combined heating surfaces	1,358 ,,
Grate area	36·5 ,,
Boiler pressure	200 lb. per sq. in.
Tank capacity	3,700 gallons
Fuel capacity	4½ tons
Adhesive weight	42 ,,
Tractive force at 75 per cent. boiler pressure	25,800 lb.
Ratio adhesive weight to tractive force	3·65 : 1
Weight of engine in working order	62 tons
,, tender in working order	37½ ,,
Total weight of engine and tender in working order	99½ ,,

The tender is of similar general design to that of the "Ab" Pacifics, but differs in detail construction, the whole of the tank, bunker, and framework being of welded construction. The tank capacity is slightly greater.

AMERICAN RAILWAYS IN EMBRYO

A HISTORICAL film, of which the rise of the railway and express industries of the United States of America is the major theme, has recently been produced by Paramount Pictures. Entitled "Wells Fargo," this picture, which embraces the period 1840-70, was planned to be one of the outstanding American films of the year and in its presentation a serious endeavour was made to achieve complete accuracy. The producer's investigations to this purpose included searches of the files of historical associations and museums, pioneer diaries and memoirs, express company records, and historical material assembled in the Wells Fargo Bank in San Francisco. A leading "actor" in the film is the early locomotive *William Galloway* (loaned by the Baltimore & Ohio Railroad), whose massive and homely proportions make even our robust *Rocket* seem unusually frail in comparison. Other features are scenes on the Tonawanda Railroad (now a part of the New York Central) and a complete facsimile of Batavia Inn, the terminus of this railway.

The "Tonawanda Railroad" of New York State was reproduced in the film on an almost disused branch of the Southern Pacific Railway in Southern California, which was specially suitable for the purpose owing to its crude appearance and entire absence of modern equipment. "Wells Fargo," apart from the outstanding skill of its presentation, is a notable film as the first serious effort to depict on the screen a part of the spectacular and absorbing history of the early American railways. Scenes from the film posed, for the press, are illustrated below. An outline of the life of William George Fargo, the founder of the famous U.S.A. firm of express carriers Wells, Fargo & Co., appears on page 650.

Above: Not alas the engine driver's mate, but a star in the film "Wells Fargo" in delightful contrast with the sturdy locomotive "William Galloway"

Left: Filming the arrival of a train at Batavia Inn

VISCOUNT ST. DAVIDS

IT is with regret that we have to record the death on March 28 of John Wynford Philipps, first Viscount St. Davids, at his residence in Buckingham Gate, at the age of 77. He was the head of a very old family in South Wales descended from a crusader of the 12th century, and his father, the late Rev. Canon Sir Erasmus Philipps, was the 12th baronet of a creation dating from 1621. Three of his brothers, Owen (Lord Kylsant), Sir Laurence Richard Philipps, Bt., and Major-General Sir Ivor Philipps, K.C.B., D.S.O., achieved prominence in their different spheres.

Viscount St. Davids was best known to our readers as Chairman of the Buenos Ayres & Pacific Railway Company and for his important interests in other railways abroad. Soon after being called to the Bar in 1886 he entered political life and was Liberal M.P. for Mid-Lanarkshire, 1888-94, and for Pembrokeshire 1898-1908. He was raised to the peerage as Baron St. Davids in 1918 and was created a Viscount in 1918. His first direct interest in South American railways was in 1899 when he was made Chairman of the Buenos Ayres & Pacific Railway Company, then a comparatively small concern of 425 miles in length and in a poor way financially, with its western terminus at Villa Mercedes, where it connected with the Argentine Great Western Railway to Mendoza at the foot of the Andes. The Pacific line also connected at Rufino with the Villa Maria & Rufino Railway of 141 miles. In the following year Mr. Philipps became Chairman of this company and also of the Bahia Blanca & North Western Railway Company, which at that time had only 234 miles actually constructed—from Bahia Blanca to Toay—with no connection with the Pacific line although its concession empowered it to build such a connection. A forward policy was soon pursued by the Pacific directors under its new Chairman. In 1904 an arrangement was made for the working of the Bahia Blanca line by the Pacific Company and during the continuance of this arrangement a new trunk line was built from the Bahia Blanca line at Nueva Roma to the Pacific line at Huinca Renanco. This arrangement lasted until the working of the Bahia Blanca line was transferred in 1923 to the Buenos Ayres Great Southern Railway Company. Relations with the Argentine Great Western Railway Company became more direct with the election of Mr. Philipps in 1904 to the board of that company of which he became Chairman in 1906, and this was followed in 1907 by an arrangement under which the Pacific Company took over the administration of the Argentine Great Western system. Mr. Philipps also became a director of the Argentine Transandine Railway Company with its metre gauge line of 112 miles connecting at Mendoza with the Argentine Great Western and at the other end with the Chilian Transandine Railway. The Argentine Transandine Railway was worked from July 1, 1907, to May 12, 1923, by the Pacific Company, when this arrangement was terminated under a scheme for working the two Transandine lines under a unified management. Under the direction of Lord St. Davids the Buenos Ayres & Pacific system was transformed into a great international highway between Buenos Aires and Valparaiso.

Lord St. Davids became Chairman of the Costa Rica Railway Company in 1896 and brought it into a stable financial position. He was elected in 1910 Chairman of the Alcoy & Gandia Railway & Harbour Co. Ltd. His latest railway interest was in the Ottoman Railway from Smyrna to Aidin when in 1922 he became President of the Council at a time when the Greek and Turkish armies had played havoc with it. Its inevitable end was its acquisition by the Turkish Government on May 1, 1935, and he had the task of arranging the transfer.

Elliott [*& Fry*

The late Viscount St. Davids

Chairman of the Buenos Ayres & Pacific Railway, and a director of many British and South American transport, industrial, and finance undertakings

He also had an indirect connection with British railways. This arose from his directorship of the British Electric Traction Co. Ltd., the board of which he joined in 1925. That company has a direct or indirect interest in most of the large bus companies in England and Wales, and in practically all cases the relative British railway is the partner of the B.E.T. in those concerns.

The following list of directorships which Lord St. Davids held at the time of his death is taken from the current (1937) edition of the "Directory of Directors":—

Alcoy and Gandia Railway & Harbour Co. Ltd. (Chairman).
Argentine Transandine Railway Co. Ltd. (Director).
Bantam (Java) Rubber Estates Limited (Chairman).
British Electric Traction Co. Ltd. (Director).
Buenos Ayres & Pacific Railway Co. Ltd. (Chairman).
Argentine Great Western Railway Co. Ltd. (Chairman).
Villa Maria and Rufino Railway Co. Ltd. (Chairman).
Catalinas Warehouses and Mole Co. Ltd. (Director).
City and Foreign Investment Trust Limited (Chairman).
City of London Real Property Co. Ltd. (Director).
Consolidated Trust Limited (Chairman).
Corporation of Foreign Bondholders (Member of Council).
Costa Rica Railway Co. Ltd. (Chairman).
Foreign Railways Investment Trust Limited (Chairman).
Government and General Investment Co. Ltd. (Director).
Governments Stock and Other Securities Investment Co. Ltd.
International Financial Society Limited (Chairman).
La Guaira and Caracas Railway Co. Ltd. (Director).
Langkapoera (Sumatra) Rubber Estate Limited (Chairman).
London and Overseas Investment Co. Ltd. (Chairman).
Metropolitan Trust Co. Ltd. (Director).
Municipal Trust Co. Ltd. (Chairman).
New York and General Trust Limited (Chairman).
Omnium Investment Co. Ltd. (Chairman).
Ottoman Railway Holding Co. Ltd. (Chairman).
Peninsular Rubber Estates Limited (Chairman).
Premier Investment Co. Ltd. (Chairman).
Primitiva Holdings Limited (Director).
Primitiva Gas Co. of Buenos Aires Ltd. (Director).
Second Consolidated Trust Limited (Chairman).
Union Commercial Investment Co. Ltd. (Chairman).
Van Diemen's Land Company.

He was elected to the Privy Council in 1914, and received the G.B.E. in 1922. From 1911 to 1932 he was Lord Lieutenant of Pembrokeshire.

RAILWAY NEWS SECTION

PERSONAL

L.M.S.R. CHIEF OPERATING MANAGER

The directors of the L.M.S.R. announce that Mr. C. R. Byrom is retiring from the position of Chief Operating Manager at the end of May, and that Mr. T. W. Royle, at present Chief Assistant Commercial Manager, has been appointed to succeed him as from June 1.

Under authority of Royal Warrants, the Viceroy of India has conferred the honour of knighthood upon the following:—

Mr. Thomas Howard Elderton, Chairman, Calcutta Port Trust.

Mr. Harold Nugent Colam, A.M.Inst.C.E., Agent, Madras & Southern Mahratta Railway.

Mr. Elderton's knighthood was announced in the Coronation honours list of 1937, and that of Mr. Colam in the New Year honours this year.

Mr. Warren J. Smith has been appointed Assistant Docks Manager of the Manchester Ship Canal Company. Mr. Bruce joined the company's service in 1894, the year the canal was opened, and has had extensive experience in all the operating departments.

Mr. William Hromadko has been appointed Chairman of Skoda Works, Czechoslovakia, in succession to the late Dr. Karel Loevenstein, whose death on February 3 this year was recorded in our issue of February 11.

Mr. W. E. Gelson, M.Sc., of the Central Standards Office, Railway Board, New Delhi, has been transferred from the class of Associate Member of the Institution of Civil Engineers to that of full Member.

Mr. J. M. Eddy, C.B.E., Director, B.A.G.S. & B.A.W.R., arrived in Buenos Aires on February 25, on a business visit.

We regret to record the recent death at Guildford, Surrey, at the age of 66, of Mr. Basil L. Gwyn. The son of the late General Hammond W. Gwyn, he served for many years on the Argentine railways, his last appointment being as Traffic Manager of the Buenos Ayres Western Railway. An attempt on his life was made by a discharged employee in 1926, and owing to the injuries he received he then retired.

Mr. T. W. Royle, who, as announced on this page, has been appointed to succeed Mr. C. R. Byrom as Chief Operating Manager, L.M.S.R., from June 1, entered the service of the Lancashire & Yorkshire Railway in 1898 and was employed in the Passenger office, subsequently being transferred to the personal staff of the Passenger Superintendent. In October, 1914 he was appointed Confidential Assistant to the then Superintendent of the Line, Mr. Arthur Watson, in connection with the Railway Executive Committee. Mr. Royle was created a Member of the Order of the British Empire in January, 1918, for services rendered during the war. He was appointed Assistant Superintendent of the Line, Lancashire & Yorkshire Railway, in February, 1919, and two years later, at the time of the amalgamation of the L. & Y. with the L.N.W.R., he became Assistant Divisional General Superintendent, Northern Division, L.N.W.R. Then when the L.M.S.R. was formed in 1923, Mr. Royle was designated Assistant General Superintendent (Western Division), L.M.S.R., and in the following year became Divisional Superintendent, Manchester. His title from 1929 until October, 1932, was Divisional Superintendent of Operation, Manchester. In the latter year he was appointed Assistant Chief Commercial Manager, becoming Chief Assistant Commercial Manager in February, 1935.

Mr. T. W. Royle, M.B.E.

Appointed Chief Operating Manager, L.M.S.R., as from June 1

Mr. R. A. Hamnett of the Divisional Engineer's office, Ashford, Southern Railway, has been elected an Associate Member of the Institution of Civil Engineers.

From *The London Gazette* of March 25: Regular Army Reserve of Officers, Royal Engineers, Transportation: Major & Bt.-Colonel J. Scott, M.C., from Supplementary Reserve of Officers, Royal Engineers (Transportation), to be Major & Bt.-Colonel, retaining his present seniority (February 28).

STAFF CHANGES ON MIDDLE-WESTERN AMERICAN RAILWAYS

Mr. H. H. Brown, Vice-President in charge of Traffic on the Great Northern Railway, has retired on account of ill health, and has been succeeded by Mr. Frank R. Newman, who has held the same post with the Minneapolis, St. Paul and Saul Ste. Marie Railway (Soo Line).

Mr. Charles P. Nash, Local Treasurer of the Chicago, St. Paul, Minneapolis & Omaha Railway, with a record of 56 years of service, retired on January 1 and was succeeded by his assistant, Mr. Ernest Melander.

We regret to record the death on March 25 of Mr. John Robinson, C.B.E., who retired in 1924 from the post of Divisional Goods Manager, Northern Division, L.M.S.R. Mr. Robinson entered the service of the former Glasgow & South Western Railway in 1877 as a junior clerk at Newmilns. After occupying other clerical positions he was attached to the Goods Manager's staff as Relief Agent. On the opening of the Canal line in 1885 he was appointed representative of the company in Paisley. A year later he returned to Glasgow as Canvasser attached to the Goods Manager's Department. Afterwards he was chosen to represent the company in the Middlesbrough district, and in 1889 became Chief Agent in the North Eastern district, with headquarters at Newcastle-on-Tyne. In the early nineties Mr. Robinson returned to Glasgow. He was Assistant to the

Mr. H. O. Tubby
Secretary, Central Uruguay Railway, 1925–38

Mr. G. Wynne Davies
Appointed General Purposes Officer, General Manager's Department, Southern Railway

The late Mr. J. J. Murphy
Superintendent, Dublin No. 1 District, Great Southern Railways, 1929-33

Some of the guests at the dinner of the Railway Convalescent Homes at the Hotel Great Central, London, on March 23 (*reported on page 608 last week*)
Photo] [Rawood

Annual dinner of the Institution of Locomotive Engineers at the Trocadero Restaurant, London, on March 25
Photo] (*see report on page 674*) [Swaine

Goods Manager from 1895-1905, when he succeeded Mr. Henry Evans as Goods Manager. In 1913 Mr. Robinson acted as Chairman of the Goods Managers' Conference, and in 1920 received the honour of C.B.E. for services rendered in connection with the war. In 1922 he was a delegate to the International Railway Congress in Rome. On grouping, Mr. Robinson was appointed Divisional Goods Manager, Northern Division, L.M.S.R.

Mr. H. O. Tubby, Secretary of the Central Uruguay Railway of Monte Video Limited, retired yesterday (March 31) after 45 years in the company's service. Mr. Tubby joined the Buenos Ayres Great Southern Railway in May, 1890, and was appointed to the Central Uruguay Railway in October, 1893. In 1899 he visited River Plate with the late Mr. H. C. Allen, the Secretary of the company at that time. Mr. Tubby was appointed Assistant Secretary, Central Uruguay Railway, in 1917, and Secretary in October, 1925. He paid further visits to River Plate in 1926, 1929, and 1932. Mr. Tubby was also Secretary of the Midland Uruguay Railway; Uruguay Northern Railway; the Miranda Estancia Company; and the Alto Paraná Development Company. During the last two years he has had an exceptionally heavy time due to the reconstruction of the Central Uruguay group of railways (reference to which was made in the May 7, 1937, issue of THE RAILWAY GAZETTE); this work was successfully concluded at the end of last year.

Mr. G. Wynne Davies, Assistant to the London East Divisional Superintendent, Southern Railway, has been appointed General Purposes Officer, General Manager's Department. Mr. Wynne Davies was educated at Repton School and at Clare College, Cambridge, where he obtained an M.A. degree. In 1926 he joined the railway as a Probationer, and was attached to London West Division, gaining experience at Windsor station and Feltham marshalling yard. In December, 1927, he was transferred to the Rolling Stock Section of the Chief Operating Superintendent, and in February, 1928, was appointed a Cadet for a four years' special course of training, embracing every department of the railway. He became an Associate Member of the Institute of Transport in 1931. On January 1, 1932, Mr. Wynne Davies was appointed to the General Manager's Office as Assistant to the Road Transport Liaison Officer, and in this capacity he acted as one of the two railway representatives on the standing joint committees of a number of the associated motor omnibus companies. He was appointed Assistant to the London East Divisional Superintendent in May, 1935. One of Mr. Wynne Davies' functions will be in connection with Air Raid Precautions work throughout the S.R. system, and at the moment he is actively engaged in this particular sphere.

We regret to record the recent death of Mr. J. J. Murphy, who retired in 1933 from the position of Superintendent, Dublin No. 1 District, Great Southern Railways (Eire). Mr. Murphy joined the former Dublin & South Eastern Railway as a porter in 1892. After passing through various traffic grades, he was appointed Wagon Inspector in 1911, became a stationmaster in 1915, and was subsequently appointed Traffic Inspector. He was appointed Superintendent of the Dublin No. 1 District, Great Southern Railways, in 1929. Mr. Murphy retired in 1933.

The funeral of Viscount St. Davids, of whom an obituary notice and portrait appear on page 670, took place yesterday (Thursday) at Roch, Pembrokeshire, and a memorial service will be held today (Friday) at St. Michael's Church, Cornhill, London, E.C.

Mr. W. S. Wreathall has been appointed a Director of the British Electric Traction Co. Ltd. in place of Mr. P. M. Rossdale, who has resigned.

We regret to record the death at Sheffield on March 10 of Mr. P. W. Fawcett, O.B.E., who until last year was Managing Director of the Park Gate Iron & Steel Co. Ltd., and was also on the board of numerous other industrial concerns. These included Thomas Firth & John Brown Limited, and Cravens Railway Carriage & Wagon Co. Ltd. Mr. Fawcett was Chief Engineer of the former from 1897 to 1921.

G.W.R. Appointments

The Great Western Railway announces the following appointments:—

Mr. F. J. Arthur, Dock Mechanical Engineer, Cardiff, Newport, and Penarth, to be Dock Mechanical Engineer, Cardiff, Newport, and Barry Docks.

Mr. W. H. Windsor, Chief Outside Foreman, Barry Docks, to be Assistant Docks Mechanical Engineer, Barry Docks.

Mr. C. Rayner Smith, Chief Clerk, Divisional Superintendent's Office, Birmingham, to be Assistant Divisional Superintendent, Birmingham.

It was announced at the annual dinner of the Institution of Locomotive Engineers, reported elsewhere in this issue, that the Trevithick prize this year has been awarded to Mr. W. S. Graff-Baker, Chief Mechanical Engineer, Railways, London Passenger Transport Board, for his paper on "Retardation of Trains." The Gold Medal of the institution has been awarded to Mr. Campbell of South America for his paper on "Railcars," and the Alfred Roslin Bennett award to Messrs. Morse and Sindu, India, for their joint paper on "Painting North Western Coaching Stock." A special prize for graduates has been awarded to Mr. Stewart Ferguson of Glasgow for his paper on "New Methods of Casting Locomotive Cylinders."

The retirement is announced of Mr. Hywel Pierce, Chief Engineer of the L.M.S.R. mail steamer, *Hibernia*, engaged on the company's Dublin-Dun Laoghaire route. Mr. Pierce, who has been in the service of the former London & North Western Railway and the L.M.S.R. for forty years, is a survivor of the war-time *Anglia* incident. Mr. Pierce was Second Engineer of the *Anglia*, an express steamer belonging to the L.N.W.R. fleet, which, after serving as an armed merchant cruiser from the outbreak of hostilities, was converted to a military hospital ship in April, 1915. On November 17 of that year she struck a mine laid by a German submarine, and sank in shallow water off Folkestone, with the loss of 168 lives. Subsequently Mr. Pierce returned to Holyhead, where he was posted to one of the railway cargo vessels. He was promoted Chief Engineer 20 years ago, and joined the *Hibernia* in that capacity five years ago.

Forthcoming Events

Apr. 1 (*Fri.*).—Institute of Transport (Nottingham Graduate), at Guildhall, 7 p.m. Annual General Meeting.

L.N.E.R. Musical Society, at Hamilton Hall, Liverpool Street Hotel, London, E.C.2, 6.30 p.m. Dinner Dance.

Apr. 5 (*Tues.*).—Institute of Transport (Metropolitan Graduate), at Inst. of Electrical Engineers, Savoy Place, W.C.2, 6 p.m. "The Rating of Railways," by Mr. F. White.

Institution of Civil Engineers, Great George Street, London, S.W.1, 6 p.m. "The Work of the Paint Research Laboratory of the L.M.S.R.," by Mr. F. Fancutt.

Railway Benevolent Institution, at Connaught Rooms, Great Queen Street, London, W.C.2, 6.45 for 7.15 p.m. Anniversary Dinner and Dance.

Apr. 6 (*Wed.*).—Institute of Transport (Manchester-Liverpool Graduate), at Central Library, Manchester, 6.30 p.m. "The Distribution of Freight Rolling Stock," by Mr. E. Townley.

Institution of Heating and Ventilating Engineers (London), at Inst. of Mechanical Engineers, Storey's Gate, S.W.1, 7 p.m. "Air Purification," by Mr. E. Joseph.

Apr. 7 (*Thurs.*).—Diesel Engine Users' Association, at Caxton Hall, Caxton Street, London, S.W.1, 5 p.m. "Bulletin, 1937. Discussion."

Institution of Civil Engineers (Bristol), at Royal Hotel, College Green, 5 p.m. "The Severn Tunnel; its Care and Maintenance," by Mr. H. Alexander.

Institution of Electrical Engineers, Savoy Place, London, W.C.2, 6 p.m. "The Trend of Design of Electric Locomotives," by Mr. C. Fairburn.

Railway Club, at Royal Scottish Corporation Hall, Fetter Lane, London, E.C.4, 7.30 p.m. "Design and Layout of Terminal Stations," by Mr. C. Anderson.

Southern Railway (London) Lecture and Debating Society, at Chapter House, St. Thomas' Street, S.E.1, 5.45 p.m. Annual General Meeting.

Apr. 8 (*Fri.*).—Institute of Transport (Newcastle), at Royal Station Hotel, 7.30 p.m. Annual General Meeting.

Institute of Transport (Newcastle Graduate), at Royal Station Hotel, 6 p.m. Annual General Meeting.

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Institution of Locomotive Engineers Annual Dinner

The annual dinner of the Institution of Locomotive Engineers was held on March 25, at the Trocadero Restaurant, London, W.1, under the chairmanship of Lt.-Col. F. R. Collins, the President. Those present were:—

Messrs. N. Ablett, C. E. Adams, E. Adams, W. A. Agnew, E. Alcock, J. F. Alcock, Colonel R. D. T. Alexander, Messrs. H. H. Andrews, R. A. Arbuthnott, J. Clubley Armstrong, G. Arnott, E. A. Ashton, H. S. Aspinall, R. M. Atkinson, Lt.-Col. S. J. M. Auld, Messrs. A. Avison, S. M. Avril, Major S. L. Baister, Mr. E. W. Baker, Lt.-Col. R. G. Bamford, Messrs. F. J. Bance, J. H. Bance, A. C. Barlow, L. Barlow-Massicks, C. B. Barratt, S. H. H. Barratt, D. S. Barrie, B. Bartleet, H. H. C. Barton, T. Barty, W. J. Bassett-Lowke, B. W. Bates, J. R. Bazin, Major H. P. M. Beames, Messrs. J. W. Beaumont, C. M. Beckett, J. E. Beckett, G. B. Beesley, A. R. Bell, E. W. Bell, Capt. G. S. Bellamy, Col. C. V. Bennett, Mr. G. Binney, Cdr. W. T. Bird, Messrs. H. Bissell, W. C. Bizley, C. J. H. Bolton, A. F. Bound, H. Leslie Boyce, A. G. E. Briggs, J. Briggs, K. Brinsmead, H. Broadbent, E. T. Brook, A. W. Brooks, A. J. S. Brown, D. C. Brown, J. S. Brown, G. Buchanan, E. Bucklow. C. J. Bullard, O. V. S. Bulleid, Rt. Hon. E. Leslie Burgin, Messrs. C. M. Burgis, J. L. Burton.

Messrs. J. E. Calverley, A. Campbell, R. C. Campbell, A. E. Cannon, K. Cantlie, D. R. Carling, A. C. Carr, F. W. Carr, H. R. Carver, J. Cave. Air-Commodore J. A. Chamier, Messrs. H. C. Charnley, A. H. Chilton, Capt. J. M. Chrystal, Messrs. H. G. Clark, R. Clark, J. Clayton, C. F. Cleaver, J. Clements, W. F. Coaker, W. C. Cocksedge, Lt.-Cdr. A. M. Coleman, Messrs. H. J. Coleman, G. Collingwood, A. F. C. Collins, Lt.-Col. F. R. Collins, Messrs. J. H. Condy, A. E. Cook, D. F. Cooper, A. G. Corrie, B. J. Corrie, J. B. Corrie, Lt.-Col. C. G. Cotesworth, Messrs. H. P. R. Coveney, G. H. Crook, Capt. H. W. Crosthwait, Dr. W. Cullen, Messrs. J. Cullimore, W. Curtis, E. E. Daglish, A. C. C. Damant, M. T. Da Silva, V. G. Davies, A. L. B. Dawson, Damar Dawson, J. F. Dawson, F. Day, F. J. Deacon, H. E. Dean, C. E. Dee, Lt.-Col. J. V. Denning, Messrs. J. R. Denny, J. Deschamps, A. Devon, S. B. Donkin, V. H. Drewry, R. J. Drury, Col. C. G. Ducane, Mr. A. Durrant.

Messrs. D. R. Edge, W. S. Edwards, T. C. Elliott, B. P. Ellis, F. O. Ellis, C. E. Fairburn, C. N. Fairchild, Lt.-Col. L. F. R. Fell, Messrs. A. L. Fielding, F. R. Fitzpatrick, L. N. Flatt, Sir E. Julian Foley, Messrs. R. E. Fordham, B. D. Fox, Col. W. S. Fraser, Messrs. M. Gabb, J. R. Garner, R. H. R. Garraway, Cdr. H. V. Gaud, Messrs. C. B. Gee, P. W. Gibbs, F. Gibbins, Cdr. C. D. Gilbert, Messrs. R. K. Glascodine, R. T. Glascodine, F. G. Glover, G. Godfrey, A. W. Goldsack, C. N. Goodall, V. S. Goodyer, Sir W. F. Gowers, Messrs. J. C. Graeme, W. S. Graff-Baker, Lt.-Col. E. Graham, Messrs. E. W. Greaves, R. C. Gregory, H. Gresham, J. N. Gresham, S. T. Gresham, N. Gresley, R. Gresley, W. H. Grieve, A. R. Gundry.

Mr. R. H. Hamilton-Wickes, Brig.-Gen. F. D. Hammond, Messrs. C. D. Hanna, V. Harbord, F. A. Harper, H. P. Harper, Capt. G. H. Harrison, Major H. A. Harrison, Mr. Ranald J. Harvey, Capt. R. F. Harvey, Messrs. B. Harvey-Smith, C. A. F. Hastelow, Major C. E. Hatcher, Messrs. C. G. Hatherly, B. T. Hempel, P. L. Henderson, F. A. Hewson, H. A. A. Hicks, F. J. Hills, C. W. C. Hine, E. J. Hobbs, C. G. Hodgson, H. Holcroft, D. E. Holden, A. G. Hopking, W. G. Hornett, R. C. Hoult, E. E. How, E. E. Howell, E. G. Humfress, E. Humphrey, G. S. Hussey, A. Hutchinson, G. D. Hyde, F. B. Illston, C. C. Inglis, S. G. Irving, H. G. Ivatt, F. H. Jefferd, P. T. Jessop, W. S. Johnson, W. Jowett, W. G. Kefford, C. Kelway-Bamber, W. Kelway-Bamber, H. E. Kemp, M. J. D. Kerr, A. J. D. Kitson, L. Kitson, W. S. Knight, F. J. Kuretschka.

Messrs. D. R. Lamb, S. M. Lanigan-O'Keeffe, P. D. La Touche, E. F. Law, E. Lawton, L. J. Le Clair, W. Leech, M. Lewis, F. C. Ley, E. E. Lloyd, G. I. Lloyd, Capt. A. B. Lockhart, Messrs. F. G. Lockwood, C. E. Long, C. E. Longley, Major E. Longmore, Messrs. E. W. Lonnen, S. Loosen, R. M. Macfarlane, Major R. G. MacIver, Messrs. W. G. P. Maclure, S. C. Manhire, R. E. Marks, P. E. Marmion, W. Marsh, E. W. Marten, F. Mason, D. C. H. Mathews, R. E. L. Maunsell, Col. A. W. M. Mawby, Messrs. H. G. McClean, G. H. R. Mead, H. Melhuish, J. W. Melville, J. C. Metcalfe, J. G. Milton, E. Mooney, S. W. Moore, F. H. Morfey, Sir Charles L. Morgan, Messrs. H. S. Morgan, J. H. Moss, Lt.-Col. A. H. L. Mount, Messrs. H. Moxon, F. T. Muncey.

Messrs. H. V. F. Narraway, O. S. Naylor, R. Needham, S. Newman, G. R. Nicholson, Capt. W. Oldfield, Messrs. R. V. Osborne, W. J. Paddock, A. H. Paige, B. W. Palmer, S. J. Payne, G. H. Pearson, K. R. Pearson, Maj.-Gen. S. C. Peck, Messrs. R. T. Pemberton, E. A. Phillipson, S. S. Pickles, E. Pollard, T. Potter, G. Powell-Jones, A. L. C. Purr, V. P. Rawlings, R. J. Reay, A. A. Richards, G. Richards, A. Richardson, G. M. Rickards, R. A. Riddles, J. S. Ridges, A. E. Roberts, D. E. Roberts, K. S. Robertson, L. W. R. Robertson, V. A. M. Robertson, D. H. Robinson, Capt. E. A. Robinson, Messrs. M. D. Robinson, J. D. Rodgers, G. Rollason, A. P. Ross, C. Redford Salmon, Eng.-Lt.-Cdr. J. G. B. Sams, Messrs. T. H. Sanders, H. H. Saunders, Capt. M. K. F. Saunders, Major E. I. Scott, Messrs. F. Sedcole, W. J. Sedcole, G. E. Shoosmith, L. H. Short, G. S. Simmons, S. S. Simpson, J. E. L. Skelton, Major J. H. Smeddle, Messrs. R. A. Smeddle, A. H. Smith, J. G. Smith, R. T. Smith, W. Gilmour Smith, A. K. Southern, A. H. Sommer, J. E. Spear, B. Spencer, J. W. Spiller, C. Spital, T. L. Squires, W. A. Stanier, C. M. Stewart, D. C. Stimson, D. Strain, T. A. Street, D. C. Stuart, T. C. Swallow, H. H. Swift, J. Swinburne, A. Sykes.

Mr. C. R. Tattam, Major E. W. Taylerson, Mr. J. Kenneth Taylor, Capt. F. Theakston, Messrs. J. H. Thom, W. B. Thompson, H. J. Thomson, Sir John E. Thornycroft, Messrs. W. G. Tilling, E. B. Todd, Major C. F. Tofts, Messrs. R. C. Toller, N. Tomkins, F. W. Tomlinson, J. L. C. Train, A. R. Turner, T. H. Turner, M. W. Tutt, C. B. Unwin, J. W. Vaughan, J. F. B. Vidal, C. C. Waddington, Capt. W. J. Wakley, Messrs. W. L. Watson, W. H. Webb, M. Weiss, F. L. Welch, G. H. Wells, G. M. Wells, R. P. Westbrook, Major Bruce G. White, Messrs. H. B. White, F. E. Whitehouse, S. Whyte, H. G. Wilkins, J. H. A. Wilkins, J. A. Wilks, S. T. Willcox, A. Williams, A. E. Williams, Major C. E. Williams, Messrs. D. Williamson, H. Wilmot, W. A. Willox, J. Whittingham, P. R. Wix, C. F. Wood, J. B. Woodman, R. Wright, W. F. Wright, G. F. Young, S. J. Young, H. Zetterström.

Dr. Leslie Burgin, Minister of Transport, proposing the toast of "The Institution of Locomotive Engineers" said he was authorised by H.M. Government to thank the institution for a year full of useful work. He referred sympathetically to the loss suffered in the passing of Sir Seymour B. Tritton. In Great Britain, he continued, we took much pride in our railway development, and because 1937 happened to be unfortunate with regard to casualties our respect for the safety of carriage and the comfort of the passengers was in no whit reduced. The figures that could be given of the utilisation of the track the twenty-four hours round were stupendous, and the necessity in any well-governed country of a highly developed and well organised railway system could not be exaggerated. Presiding over a Department of State dealing with transport, he was personally profoundly interested in the various developments for ever taking place in the railway field, such for example as the experiments which Mr. W. A. Stanier was making on the L.M.S.R. with his new diesel unit. He was interested also in the fixing of speed indicators and recorders on engines, and congratulated those railway systems that were adopting them more and more as standard practice. It did not follow because a report stated that a train passed at a particular speed that that had any bearing on scientific fact, and the speed recorder was a material factor in checking the report afterwards. He was very interested in automatic train control and appreciated the enterprise of those railway managements which were spending more and more on research and development along these lines. The more we helped the driver, he emphasised, the more we made safety a matter of engineering control and less governable by the human element, the better results we should ultimately achieve. The minister said he had been wondering what bugbear would most disturb the equanimity of the locomotive engineer; whether it would be the problem of boiler maintenance or brake block wear, or instructions from the management to endeavour to restore some of the engines to pre-war cleanliness.

Lt.-Colonel F. R. Collins, responding, said that the institution existed for the advancement of the science and practice of locomotive engineering comprising the mechanical, electrical, and other means for effecting the movement of railway and other vehicles. This year's summer meeting was to take place between June 8 and 12 in Glasgow, where the Empire Exhibition was being held, and Dr. Dorpmüller and fourteen other officers of the German State Railway had accepted the council's invitation to join the party.

Major C. E. Williams, proposing the toast of "The Guests," referred appreciatively to the presence of Dr. Burgin; Sir Wm. Gowers; Mr. Lanigan-O'Keeffe; Lt.-Colonel A. H. L. Mount; Brig.-Gen. Hammond; the Presidents of the Institutions of Civil, Mechanical, Automobile, Marine and Railway Signal Engineers and the Iron and Steel Institute; Sir John E. Thornycroft, and Sir Charles L. Morgan; Mr. V. A. M. Robertson; and Mr. George Binney. In connection with the work of one of their guests, Sir Wm. Gowers, Major Williams stated that all locomotives, carriages, wagons, and other engineering supplies required for the Colonies were ordered through the Crown Agents from British firms.

Mr. S. M. Lanigan-O'Keeffe, High Commissioner for Southern Rhodesia, in replying to the toast, said that Southern Rhodesia knew where the best locomotives came from, had always bought from Great Britain consistently all its engines, wagons, carriages, rails and all the machinery incidental to what is now a rather important railway system. What was more, he assured his listeners, they intended to buy from this country in future.

T.P.O. Centenary Ceremonies

Inauguration of the exhibition at Euston—The centenary banquet

Throughout this week members of the public have been afforded the opportunity of seeing something of the evolution of the travelling post office in an exhibition of rolling stock on platform No. 6 at Euston station, L.M.S.R. This exhibition was inaugurated on Monday morning last at a ceremony in which Major the Rt. Hon. G. C. Tryon (Postmaster-General), the Rt. Hon. Sir Harry Twyford (Lord Mayor of London), Councillor J. Sperni (Mayor of St. Pancras), and Sir Josiah Stamp (Chairman of the L.M.S.R.) participated. After inspecting the exhibition train, the party gathered at the north end of platform No. 6.

Major Tryon, the Postmaster General, said he was grateful for the presence of the Lord Mayor of London, the Mayor of St. Pancras, and the distinguished company that had assembled to honour the celebration of one hundred years of progress in the transport of mails by the railways. It was a celebration in which the railway companies and the Post Office were equally concerned, and he was particularly obliged to Sir Josiah Stamp, the Chairman, and the directors of the L.M.S.R. for staging at Euston the interesting exhibition of the development of the travelling post office from its earliest days to now. One hundred years ago the first travelling post office, consisting of a horse-box temporarily fitted up as a sorting carriage, inaugurated a new era of mail transport by its experimental run on the Grand Junction Railway between Birmingham and Liverpool. It did duty for six months, covering a little more than 100 miles in four and a half hours. The first travelling post office from London started at Euston and finished at a point a little north of Bletchley, and later in 1838 this service was extended to Preston. From those early days the services rapidly grew, with the constant and cordial co-operation of the railway companies, until the whole of Great Britain was now covered by a network of more than 70 travelling post offices. Their total annual mileage was nearly four millions and the number of postal items dealt with every year exceeded 500 millions. Some 500 men of the Post Office staff were daily engaged in sorting this huge mail while travelling throughout all parts of the United Kingdom at speeds up to 80 m.p.h.

Sir Josiah Stamp, Chairman of the L.M.S.R., in reply, said that Euston was the most suitable place for such an exhibition, as it was from that very platform that 100 years ago the first train started to carry mails from London to the North. Great as were the advances that had been made in travelling post offices in the intervening century, they were really only improvements of detail, for the mail bag apparatus today was in essence what John Ramsay suggested in 1838, and the idea of the travelling sorting office went back to the days of the mail coach. He had an original time sheet supplied to Euston by the Post Office 100 years ago, which he was delighted to present to the Postmaster-General, as he felt it should return home after so long an absence.

The Postmaster-General gratefully accepted the framed gift of this historic relic.

The Lord Mayor of London then read the following text of letters he proposed sending to the Lord Mayor of Birmingham and the Lord Mayor of Liverpool:—

"My dear Lord Mayor,—It has been my pleasure today to inaugurate the exhibition train which has been formed in London by the Post Office and the London Midland & Scottish Railway Company in celebration of the centenary of the travelling post office. In this train I have visited a reconstructed model of the first travelling post office which one hundred years ago commenced running between Birmingham and Liverpool. I feel sure that you would desire to be associated with me in rendering a common tribute to the industry of the Post Office and the railways which has developed the present-day network of travelling post offices covering the whole of the United Kingdom. In 1838 only one sixteen-foot carriage weighing 4 tons was employed on postal work. In 1938 more than 70 travelling post offices, each carriage weighing 33 tons are in service. The intricate organisation of this modern mail service—gradually built up, and constantly being developed—functions so smoothly that few members of the public realise that it is responsible for our easy acceptance of the unfailing arrival of our morning letters. Some of these mail trains are direct continuations of the old mail coaches. The Irish Mails succeeded the "New Holyhead Mail Coach" which ran from "The Swan with Two Necks" in London by way of Birmingham and Shrewsbury to "The Eagle and Child" at Holyhead, crossing the Menai Strait to Anglesey over Thomas Telford's famous Suspension Bridge. Exactly a hundred years ago this coach journey occupied 28 hours—and before steamships were invented, sailing packets added another 20 hours more for the crossing of the Irish Sea from Holyhead. Not less than 48 hours were needed therefore for the through journey of the Irish Mails from London to Dublin. Today one hundred years later the same journey takes 9¼ hours or less than one-fifth of the time. Great success has been achieved by the travelling post offices, but it is a success that has been hard won. The staff working at speed in confined spaces and within rigid time limits has always to cope with an ever-varying influx of letters and packets. The system demands untiring efficiency and alertness. In celebrating the hundred years progress of mail transport by railways, I would pay a high tribute to the men of the travelling post offices who have made that progress possible.—Yours, sincerely, H. TWYFORD, Lord Mayor of London."

The Lord Mayor then handed the letters for despatch to the Postmaster-General, who placed them in a special silk bag. A postman then inserted the bag in the leather pouch, which he fixed on a mail standard specially erected at the end of the platform. A railway guard handed Sir Josiah Stamp a special silver whistle (presented by the Post Office), which he blew as a signal for the exhibition train to leave. As the guard gave the "right away" signal with a green flag, the driver of the train acknowledged with a short blast on the locomotive hooter. The train moved out of the station with the net of the sorting carriage swung out, and the leather pouch containing the Lord Mayor's letters was picked up as the train passed the standard.

Sir Josiah Stamp signalling the exhibition train to start

The official party then proceeded to the Shareholders' Meeting Room, through the passage leading from No. 6 to No. 9 platform to view the Post Office film "Night Mail" and the L.M.S.R. film "Coronation." The poem by Mr. W. H. Auden, which is recited as a commentary to the former, is reproduced on our Scrap Heap page this week.

Centenary Banquet

A banquet in celebration of the centenary of the travelling post office was held at the Savoy Hotel on Monday, at 8 p.m., at which the Postmaster General, Major G. C. Tryon, M.P., presided. He sent a loyal telegram to the King, to which His Majesty replied.

Major Tryon, in the course of his speech, announced that the Post Office will place orders for the construction of six new sorting carriages specially constructed to ensure the comfort of the Post Office staff. Features of the new carriages would be: an electric tea urn and oven for cooking meals; special curtain arrangements to exclude draughts from the doors and gangways, and behind sorting tables; and an overhead steam-heating pipe suspended from the roof, in addition to ordinary

heaters. He continued: "Every year the Post Office handles more than 7,500 million letters and 163 million parcels. Eighty per cent. of the letters amounting to 25 million bags and 150 million parcels travel annually in British trains. Today the whole of Great Britain is covered with a network of more than seventy travelling post offices. Ten million letters and packets a week are handled in these travelling post offices on British railways which cover some 3,700,000 miles each year. The Post Office as a whole is probably the largest individual railway customer —so much so, indeed, that the structure of the railway timetable is based on the skeleton service provided to meet Post Office requirements."

After outlining the development of sorting carriages and mail exchange apparatus, Major Tryon said: "All kinds of landmarks—houses, trees, bridges—have been made use of to remind the officials on the train of their position, and it is recorded that on one section a white horse in a field was made use of for some time. Unfortunately and without giving any advice, the horse died, and a number of places missed their mail that day."

Sir Josiah Stamp, in responding, said that this month the L.M.S.R. had made improved timings which would save the Post Office 168 minutes a day.

Mr. G. R. Roberts, a member of the travelling post office staff for 26 years, expressed thanks for the generous tribute which had been paid to the men engaged in the service.

Those at the banquet included:—

Sir Alan Garrett Anderson, Messrs. G. T. Archibald, R. H. Bailey, Sir Charles C. Barrie, Messrs. V. M. Barrington-Ward, H. H. Bashford, the Hon. R. E. B. Beaumont, Messrs. J. Y. Bell, C. G. S. Blackmore, A. F. Bound, J. C. Bowyer, T. H. Boyd, T. B. Braund, J. H. Brebner, C. R. Byrom, A. Cavalcanti, R. Clarke, G. Cole-Deacon, W. F. Cook, T. B. Cox, Lt.-Col. E. T. Crutchley, Mr. M. J. Cullinan.

Messrs. C. R. Dashwood, J. A. Davies, C. W. Drew, F. W. St. A. Ellis, Evan Evans, Sir Thomas Gardiner, Messrs. W. G. Gilbert, L. C. Glenister, E. Gomersall, Eric Gore-Brown, F. G. Gould, G. H. Gould Smith, H. Graham White, K. W. C. Grand, Sir Guy Granet, Messrs. B. G. D. Hall, I. Hall, Chas. J. Hambro, F. C. Hart, Sir Harold Hartley, Lt.-Col. A. P. Heneage, Messrs. William Lionel Hichens, A. G. Highet, Lt.-Col. T. P. Hobbins, Messrs. R. Holland-Martin, J. B. Holmes, Viscount Horne of Slamannan.

Messrs. A. M. T. Ireland, G. Ismay, A. E. Jones, Lt.-Col. F. H. Kempe, Messrs. V. R. Kenny, A. R. Kidner, F. W. Knight, J. Leader, the Rev. W. E. Lees, Messrs. C. O. L. Leigh Clare, D. J. Lidbury, Sir H. A. F. Lindsay, Dr. Stefan Litauer, Mr. R. A. Little.

Lt.-Col. A. J. McCarraher, Messrs. R. G. McGrath, W. Maiden, F. Martin, F. C. Marwood, H. H. Mauldin, E. J. Missenden, G. Morton, W. H. Morton, H. Napier, C. H. Newton, E. E. Painter, Lord Palmer, Messrs. C. Parker, H. J. Parrott, W. M. Perts, F. R. Potter, H. E. Powell Jones, J. Purves, F. R. Radice, Sir James Rae, Messrs. H. J. Ranzetta, E. Rawdon Smith, Sir John Reith, Messrs. G. Roberts, J. J. C. Rowden, T. W. Royle.

Messrs. C. J. Selway, L. Simon, A. G. Simpson, T. Somerset, F. C. Southgate, Councillor J. Sperni, Sir Josiah Stamp, Messrs. C. R. Stampe W. A. Stanier, J. B. Stephens, Gilbert S. Szlumper, Sir S. G. Tallents, Mr. W. D. Taylor, Major the Rt. Hon. G. C. Tryon, Messrs. A. G. Tydeman, C. C. Vincent, F. Warriner, A. P. Waterfield, R. H. Watt, H. Wheeler, H. E. O. Wheeler, Sir Raymond W. Woods, and Mr. J. E. Yates.

The Union between Germany and Austria

Incorporation of the Austrian Federal Railways in the Reichsbahn

The union of Austria and Germany dates from March 13, and the incorporation in the Reichsbahn of the Austrian Federal Railways (*Oesterreichische Bundesbahnen*) from March 18. They comprised some 5,930 km. (3,685 miles) of route, of which 490 km. (305 miles) were narrow gauge and 870 km. (541 miles) electrically operated. The staff totalled 57,008, and in 1936 52½ million passengers were carried. About 2,580 km. (1,603 miles) of motor services were operated by a subsidiary concern.

The lines were formerly the property of the Austrian Republic and worked on its behalf a separate administration, now dissolved. The property has been transferred to the German Reich, and all managerial and other functions have been taken over by the Reichsbahn administration, itself a part of the Ministry of Transport. The Minister, Dr. J. Dorpmüller, who is General Manager of the Reichsbahn, is thus now responsible for the united railway system and has issued a special address of greeting to the members of the former Austrian Federal Railways staff, welcoming them to the Reichsbahn ranks and inviting them to co-operate "for Leader, people, and homeland." A further address has been published by Herr Kleinmann, his chief assistant, who was responsible for the transfer arrangements. The local government of the new German province of Austria has passed the necessary decrees rendering the change effective.

The former General Management at Vienna continues in existence as a special Austrian Sectional Management and—under Dr. Dorpmüller—is for the time being to possess the same competence and carry out the same functions as before, Herr Röbe, formerly a Divisional Manager of the Reichsbahn, acting as Special Commissioner. The old Divisional Managements at Vienna, Linz, Innsbruck, and Villach are now known as *Reichsbahndirektionen*. The offices of the Austrian Ministers for Commerce, Transport, and Finance are being continued temporarily on technical grounds, and have certain functions allotted to them in the transitional arrangements, especially in connection with the private railways in Austria, over which they continue to exercise supervision, pending a complete investigation of all the legal matters involved.

Improved services between Berlin and Vienna *via* Passau have been announced already, leaving Berlin at 7.30 p.m. and reaching Vienna at 9.10 a.m., and with reverse times at 7.22 p.m. and 9.15 a.m., with restaurant cars between Berlin and Leipzig, Vienna and Linz. There will also be a new day service leaving Berlin and Vienna at 8.0 a.m. and reaching the opposite terminals at 8.5 p.m. and 8.44 p.m. respectively, also with restaurant service. One service now running between Essen and Nuremberg is being continued to Linz and a connection to and from Vienna is being made with one of the Berlin—Munich services, forming a new Berlin —Vienna day connection *via* Regensburg. Other improvements in the services to and from Austria are stated to be in preparation.

Staff and Labour Matters

L.P.T.B.—Extra Holidays for Territorials

The Parliamentary Secretary to the Ministry of Transport in replying to the debate on the London Passenger Transport Bill on March 8, said that on the matter of recruiting for the Territorial Army he was disappointed with the action of the board. He could see no reason why the board should not give encouragement to join the Territorial Army. In moving the second reading of the Bill, Sir Ralph Glyn had said that the board admitted that the record so far as current war service was concerned would not appear satisfactory, yet the board had not refused anyone consent to serve in the Territorial Army.

The outcome of the discussions which followed between the Government Department and the L.P.T.B. was made known on March 24, when Dr. Leslie Burgin, the Minister of Transport, announced in the House of Commons that London Passenger Transport Board employees who join the Territorial Army will get an extra week's holiday with pay, less their Territorial Army allowance.

Holidays with Pay

An agreement, providing for six days' holiday with pay for men on maintenance work, was concluded on March 24 between the Amalgamated Engineering Union and the Iron and Steel Trades Employers' Association, the Cleveland Iron Masters' Association, the West Coast Iron Masters' Association, and the Lincolnshire Iron Masters' Association.

National Union of Railwaymen

The National Union of Railwaymen celebrated its Silver Jubilee on March 29. Twenty-five years ago the Amalgamated Society of Railway Servants with 132,002 members, the General Railway Workers' Union with 23,158 members, and the United Pointsmen & Signalmen's Society with 4,101 members were amalgamated into the National Union of Railwaymen, with funds totalling £394,000. Today the National Union of Railwaymen has a membership of 364,356, with funds totalling £2,220,000. We refer to this Silver Jubilee in a note on page 650.

PARLIAMENTARY NOTES

London Passenger Transport Board Bill

As briefly mentioned in our issue of March 11, the second reading debate on this Bill on March 8 was adjourned.

Sir Ralph Glyn, moving the second reading of the Bill on March 8, said that it contained no works of great magnitude, but they were all works which were essential if the schemes, many of which had been approved by the House, were to be put into execution. The most important matter in the Bill was that dealing with the Wood Lane scheme, which was necessary in order to provide additional siding accommodation and to carry out realignment of the railway to permit eight-coach trains to pass round the curve, which they could not do on the present alignment. Unless that work was put through in proper time it would not be possible to complete the programme that had already been approved whereby trains would run off the London Passenger Transport system on to the Great Western and complete the journeys to Ruislip and Denham. Owing to the increased number of coaches attached to the ordinary trains run on the London Passenger Transport system and to the fact that the tunnels had been extended in many cases, the ventilation question became of great importance. It was the duty of the London Passenger Transport Board to see that there was an adequate and proper ventilation throughout the tube system. If the Bill was not given a second reading, that work would be delayed. It had been found by practice that the ordinary extractor fans did not accomplish the work as satisfactorily as was once thought, and it was essential to acquire property and sink shafts in order to have clear ventilation to the upper air. Another matter contained in the Bill was the extension of time. In the Act passed in 1935 certain important works were authorised, and some had not been completed, partly owing to difficulties of obtaining necessary material, and partly in order to push forward other works of perhaps greater importance. He would mention only the following points contained in the Bill: The Harrow and Rickmansworth widening scheme; Baker Street reconstruction scheme; sidings at the Elephant and Castle; and unless they were built it would be impossible to accommodate the necessary number of trains to serve the peak and rush hours; and the extension at King's Cross where tremendous works were being carried out to meet the interchange arrangements for the convenience of passengers coming off the Great Northern line and joining that network of underground services which coalesced at King's Cross. At South Kensington the fly-over junction was of great urgency, and permission to extend the date for that and the other works was asked for a further period of 24 months up to October, 1940. The present permission under the Act of 1935 expired in October this year. Another matter contained in the Bill, which was of vital importance in connection with the services of defence, was the interchange of electrical supply. In a time of emergency it was necessary to maintain the underground communications now more than ever. Until now it had been possible for the board to rely solely upon its own sources of supply. The Bill provided that the board have power to make such agreements with the Electricity Board as were now considered essential to meet the new circumstances.

Dealing with the question of recruiting for the Territorial Army, he said that he recognised that many people felt that it was the business of a great undertaking like the London Passenger Transport Board to set a good example in this matter, but the House must remember two things. The first was that a transport undertaking had definite obligations and duties to the public, not only in peace time but certainly in war. The total number of men who were on the pay roll of the London Passenger Transport Board who belonged to the Territorial Army was 383, but it must also be remembered that there were 1,815 Army Reservists who would be called up. The board employed 82,000 men. Of that number, 74,000 were highly specialised men. On the average it cost £25 to train each skilled man. Such men could not be replaced, they were irreplaceable. Last year it was properly and rightly agreed that all the employees should be entitled as in the case of main line companies to have a fortnight's holiday with pay. In order that that should be done it was necessary to employ another 1,400 men. They had to be taken on as extra to the normal establishment and trained so that they could replace those who were having their holidays. He understood that the complaint was that the board did not at present pay to the men who were in the Territorial Army their full pay when they had that extra week in camp. If they wanted to do something to help the training of men who were Territorials, was it not up to the War Office to provide certain facilities so that men could train outside the holiday period? Surely arrangements might be made for railway men to go to the depots or some alternative? He hoped that the House would give the board the opportunity of consulting not only with the War Office, but with the Ministry of Transport and all other Government Departments, recognising that they had a new situation, and that a railway man engaged in transportation was a valuable asset in the home front. He begged the House to give the Bill a second reading.

Mr. H. Parker (Romford—Lab.) moved the rejection of the Bill. He said it was generally recognised by members that the London Passenger Transport Board was an entirely irresponsible body so far as the House was concerned. The policy of the board ought to be controlled by Parliament and the Ministry of Transport ought to be responsible for appointing the board. It was also essential that the accounts of the board should be submitted yearly to the House and approved by the House. That would give an opportunity to members to voice their grievances against the board and to control its policy. There was a strong feeling throughout the whole of the eastern suburbs of London that they did not get a square deal. There was great discontent because of the long delay with regard to the electrification of the North Eastern Railway out from Liverpool Street, and that was an essential part of the general scheme for serving that area.

Mr. G. Lansbury (Bow and Bromley —Lab.) seconded the rejection of the Bill. He said it was time that a tube was put down the East India Dock Road, and that they had a connection down that road to Barking. If the board were to run a tube down Commercial Road and East India Dock Road and through to Barking, and in any other direction on that side of East London between Bow Road and the river, he was sure they would find tremendous business.

Mr. E. H. Keeling (Twickenham—C.) supported the amendment because of the attitude of the board to the Territorial Army. He said that the board was failing to bear its proper share of the burden of defence, and especially the defence of London. The board was conspicuous among the large employers in London in giving no extra leave with pay, though in approved cases it did give one extra week's leave without pay. With regard to the difficulty about granting leave he said that the War Office had met that point by arranging that, where it was not convenient for a man to go to a summer camp, he could put in a fortnight instead, at some other time of the year more convenient to him, at a depot.

Captain Austin Hudson (Parliamentary Secretary to the Ministry of Transport) reminded Mr. Parker that a full report was made by the board from year to year to Parliament, and the acounts were published. As regarded the question of Territorial Army recruiting, he must say definitely that he did not think that the board had acted well in the matter. The Minister of Transport the previous day had notified the board that he found himself unable to support the attitude of the

board on this issue, but in reply, he got no offer whatever of conciliation or of an effort to meet the point of view which was obviously felt by a large number of members. The work which the board would have to perform in time of war was being considered seriously by his department. They could, however, see no reason why the board should not give more encouragement to men to join the Territorial Army, and they felt that, if that led to larger numbers of men joining, that circumstance would not prejudice the usefulness of the board's undertakings in time of war. The War Office entirely agreed with the attitude the Minister of Transport had taken up. On the other hand the Ministry would be very sorry to lose this Bill, which contained useful provisions for the improvement of London transport. There was work in the Bill to the value of £287,800. The rejection of the Bill would not punish the board so much as the citizens of London. He suggested the House should give the Bill a second reading, and reserve the right, if they wished, to reject it on the third reading. In the meantime the board would have an opportunity of studying the speeches, and the Minister of Transport would ask the board's Chairman to confer with him to see whether he could not suggest some arrangement to meet the wishes of the House.

Mr. R. D. Denman (Leeds Central —Nat. Lab.) moved the adjournment of the debate.

Mr. Herbert Morrison (South Hackney—Lab.) thought it better that a decision should be made by the House. He did not think any of the issues raised were of such a character as to stop useful improvements in transport facilities being undertaken.

Mr. George Balfour (Hampstead—C.) said that the general issue should be dealt with by public legislation, and the opportunity should not be taken under the Private Bill procedure to thrust forward special matters, which were broad in application and applicable to many undertakings similar to the London Passenger Transport Board.

Mr. H. G. Williams (South Croydon —C.) said the House would be rendering a valuable service if it postponed the debate to give the board an opportunity to think again.

On a division the motion to adjourn the debate was carried by 186 to 131.

[Pressure of other Parliamentary business has resulted in further adjournments from time to time.]

LECTURE BY MR. F. R. E. DAVIS.—On Wednesday, Mr. F. R. E. Davis, C.B.E., F.C.I.S., F.S.I., the Secretary of the G.W.R., gave a short talk to the Aldersgate Ward Club on "A Hundred Years of Railway Development, with special reference to the Great Western Railway." The lecture, which took place at the Cordwainers Hall, 7, Cannon Street, E.C.4, was illustrated with a number of lantern slides of great interest.

QUESTIONS IN PARLIAMENT

L.P.T.B. and Employees in Territorial Army

Mr. E. H. Keeling (Middlesex, Twickenham—U.) on March 24 asked the Minister of Transport whether he had any statement to make as to the attitude of the London Passenger Transport Board to its employees in the Territorial Army.

Dr. Leslie Burgin (Minister of Transport): Following upon the debate in this House on March 8, I have been in communication with the London Passenger Transport Board, and I think that a satisfactory solution of this matter has now been reached. The board is willing to grant one additional week's leave of absence with pay (less Territorial Army allowances) to members of its staff joining the Territorial Army. The board proposes no limitation until it appears to be necessary for the protection of the public services for which it is responsible. At this stage the board will consult with me again. The board's difficulty, which is common to all transport undertakings, is that the maximum demand for service coincides with the normal camping season and so prevents the release of men for training. There are times in the year arising out of seasonal changes in the volume of traffic to be carried when the board could readily release a number of men. I am in consultation with my right hon. friend, the Secretary of State for War, with a view to seeing what arrangements may be possible to avoid the withdrawal from their work of a large number of men simultaneously, particularly during the peak periods of traffic.

Dr. Burgin expressed the hope that it might now be possible to get the Bill through its second reading, as it related to the construction of public works which are urgently required, and delay in the passage of the Bill meant the possible risk of unemployment for a number of persons.

Lieut.-Colonel G. J. Acland-Troyte (Tiverton—U.): Is the Minister of Transport aware that there is still objection to Clause 48?

Dr. Burgin: If reference is made to Clause 48, I hope hon. gentlemen will await the statement on the Bill. Clause 48 is required in the Bill, and it has my blessing.

Uniformity of Fares from Stanmore and Edgware. Discussions not completed

Sir Reginald Blair (Middlesex, Hendon—U.) on March 28 asked the Minister of Transport whether the discussions which took place last June to bring greater uniformity of fares from Stanmore, Metropolitan Line, and Edgware, Morden tube, had brought any result.

Capt. Austin Hudson (Parliamentary Secretary to the Ministry of Transport): The London Passenger Transport Board informs me that its discussions with the railway companies on this matter have not been concluded. I would remind my hon. friend that these discussions are directed to securing a greater measure of uniformity of fares when the works now in progress to enable trains to be run from the Bakerloo tube section of the board's lines on to its Stanmore section are completed. I understand that this connection is not likely to be opened before the summer of 1939.

Euston Station and the Doric Arch

Mr. E. H. Keeling—(Middlesex, Twickenham—U.) on March 29 asked the Minister of Transport whether his attention had been drawn to the proposal of the L.M.S.R. to destroy the Doric gateway of Euston in the course of building a new station with money borrowed under Treasury guarantee; whether he was aware of its beauty and historic interest; and whether he would consult the Royal Fine Art Commission as to whether it could and should be moved to another site.

Capt. Austin Hudson (Parliamentary Secretary to the Ministry of Transport): I am informed by the L.M.S.R. that, in the preparation of the drawings for the new building at Euston, very careful consideration has been given by the architects to the possibility of embodying the Harwick portico in the design, but that it has not been found feasible to do so. The company is willing to consult the Royal Fine Arts Commission with regard to the feasibility of the removal of the portico to another site. I am assured that the company fully appreciates the historic interest attaching to this gateway and is entirely sympathetic towards the proposal that steps should be taken to secure its preservation. It will gladly give permission for the removal and re-erection of the gateway on another site if those interested in its preservation are willing to bear the expense which would be incurred over and above the ordinary costs of demolition.

Mr. F. C. Watkins (Hackney Central—Lab.): Is the Parliamentary Secretary aware that at the time this gateway was erected Ruskin objected to it as being inappropriate for a railway terminus, and that the community wishes the company well in planning a new station at Euston?

There was no reply.

WROUGHT IRON AND STEEL TUBES.—Two British Standard Specifications have been issued respectively for wrought iron tubes and tubulars, and steel tubes and tubulars, of what are commonly known as gas, water, and steam qualities. Copies (No. 788 for Wrought Iron Tubes and No. 789 for Steel Tubes) may be obtained from the British Standards Institution, 28, Victoria Street, S.W.1, price 2s. each.

RAILWAY AND OTHER REPORTS

Milford Docks Company.—This company reports a net profit of £8,691 for the year 1937, compared with £5,406 for 1936, after providing £5,000 (against nil) for subsidiary's loss and crediting £4,000 (against nil) from tax reserve not required.

Leeds & Liverpool Canal Company.—Profits for the year 1937 amounted to £10,797, compared with £10,335 for 1936. A dividend of 1½ per cent. is again to be paid on the ordinary stock, leaving £5,965 to be carried forward, against £5,263 brought in.

International Railways of Central America.—Railway operating revenues in 1937 were $5,699,442, an increase of $747,870 over 1936. In the railway operating expenses of $3,230,907 there was an increase of $221,647. Total income amounted to $2,363,290, compared with $2,078,383 in 1936, and fixed charges were covered 1·95 times. Net income, after all charges, taxes, and other reserves, was $1,102,428, equal to $11·02 a share of preferred stock, on which there were arrears of $26·25 a share on December 31, 1937. Net income for the year 1936 was $677,981. During 1937 the company enjoyed a large increase of banana traffic, resulting primarily from the development of the activities of Compania Agricola de Guatemala on the Pacific side of Guatemala. Import traffic was substantially better.

Trent Motor Traction Co. Ltd.—Total revenue for 1937 of this company, which is controlled jointly by the L.M.S.R. and L.N.E.R. companies and Tilling & British Automobile Traction Limited, amounted to £545,984, against £525,724. After deducting expenses of £473,543, including £59,030 for depreciation, there is a balance of £72,441, to which has to be added £12,120 brought forward. General reserve takes £29,082, against £20,000, and the dividend of 10 per cent. on 375,200 shares remains the same, requiring £37,520. A dividend is also recommended at the rate of 10 per cent. per annum on 75,040 new shares ranking for dividend as from July 1, 1937. This takes £3,752, leaving £14,207 to be carried forward. Expenditure on capital account during the year amounted to £118,353, and was mainly for new omnibuses and garages.

Sorocabana Railway Company.—The advisory committee announces that the sterling funds available for distribution on account of the coupon due April 1, 1938, of the first debentures, amount to £5,062. The Committee has fixed the interest payable on April 1 on the £1,474,360 first debentures outstanding at ½ per cent., leaving £1,376 to be carried forward to the credit of the first debenture holders. According to the report of the company for 1937, the interest and dividends on investments and sundry profits amounted to $135,952, compared with $122,846 in 1936. After deduction of expenses, &c., the amount available for 1937 was $76,719, against $96,347. During the year the company was able to transfer to London £27,094, compared with £24,178. These remittances enabled distributions to be made to first debenture holders at the rate of 1 per cent. on April 1, 1937, and 1 per cent. on October 1, on account of coupons due on those dates.

Switchgear & Cowans Limited.—Net profits for the year 1937 amounted to £53,618 on an issued capital of £120,000, compared with net profits of £34,483 on a capital of £100,000 in 1936. After providing £18,141 for taxation and N.D.C., the directors recommend a dividend of 20 per cent. (the same), and place £15,000, against £5,000, to general reserve. The amount to be carried forward is £7,534, compared with £5,057 brought in.

Coventry Machine Tool Works Limited.—For the first year of the company's operations as a public company the profit on trading, after charging all expenses, was £16,880, and the net profit, before income tax, was £14,389. A dividend is being paid of 8 per cent., less tax, leaving £2,143 to be carried forward. The extensions and new plant at the Coventry works have already been fully justified. Rearmament orders are having comparatively little direct effect on orders. Many valuable orders have been received from all parts of the world. The orders now on the books at Coventry are the largest in the history of the company, and there is over a year's work in hand.

Craven Brothers (Manchester) Limited.—The accounts show a net profit for 1937 of £76,173, against £40,718 for 1936. It is proposed to pay a final dividend of 10 per cent., making 15 per cent. for the year (against 12½ per cent.), to transfer to equalisation of dividends reserve account £10,000 (against nil), and to increase the balance forward from £5,742 to £26,915. The works were fully employed throughout the year and the extensions are completed and in production. The output for the year was the highest on record. The volume of orders received in the same period was also the highest on record, and the volume of work in hand at the close of the year is greater than at any time in the long history of the company.

Thos. Firth & John Brown Limited.—Net trading income for the year 1937 amounted to £860,733 compared with £648,431 for 1936. Net profit after crediting miscellaneous income and deducting £100,000, against £92,000, for depreciation, £175,000, against £120,000, for taxation, and other charges, is raised from £390,533 to £537,632. The directors again transfer £100,000 to general reserve and make a new allocation of £100,000 to stock reserve. The ordinary dividend for the year is 17½ per cent. tax free, compared with 15 per cent., tax free, for 1936, and the amount to be carried forward is £97,366. All branches of the business, including that of Firth-Vickers Stainless Steels Limited, contributed to the general improvement shown.

Consolidated Signal Co. Ltd.—A dividend on the ordinary stock of 36½ per cent., less tax at 4s. 11d. in the £, is recommended for the year ended September 30, 1937. This compares with 30 per cent. of the previous twelve months.

Clayton Dewandre Co. Ltd.—The directors recommend a final dividend of 5½ per cent. (making 8½ per cent. for the year, against 8 per cent.) on the ordinary stock and a dividend of 9½ per cent., less tax, on the deferred stock (against 8 per cent.). The amount to be carried forward is £2,940, against £6,556, after allocating £8,000 (against nil) to general reserve and £10,000 (the same) to undivided profits account. Last year £6,250 was written off preliminary expenses.

British Thomson-Houston Co. Ltd.—The accounts for 1937 show a profit, after providing for income tax and N.D.C., of £651,673, compared with £553,714 for 1936. Debenture and loan interest requires £78,235, the sum allocated to depreciation is £267,460, against £236,525, and the expenditure on patents, &c., written off is £4,401. This leaves a net profit of £301,577, compared with £244,196, to which must be added £188,581 brought in. Preference dividends, less tax, take £78,750, the amount appropriated to reserve is £100,000, against £50,000, and the ordinary dividend recommended of 7 per cent., less tax, is the same as for 1936, and takes £105,000, leaving £206,408 to be carried forward. The orders received and the output were greater and the orders on hand at December 31, 1937, showed a substantial increase over those at the end of 1936.

Associated Electrical Industries Limited.—Gross profit for the year 1937 amounted to £1,290,008, an improvement of £234,384 in comparison with 1936. After deducting £380,759 for taxes and N.D.C., against £267,574 for taxes, and £217,756, compared with £149,574, for depreciation, there is a balance of profit of £691,493, an increase of £53,017 on the previous year. The ordinary dividend is maintained at 10 per cent. and sums of £100,000 are allocated to special reserve and towards the establishment of a dividend equalisation account, respectively, as compared with £100,000 to general reserve in 1936. The amount brought in is £176,118, and the sum to be carried forward is increased to £220,015. The output of the various works was greater than in previous years. Orders received during 1937, as well as orders in hand at December 31 last, showed a substantial increase over 1936 and constituted a record.

NOTES AND NEWS

Permanent Way Institution Summer Convention.—The annual summer convention of the institution is this year to be held in Cologne from June 25 to June 30.

Brazil Great Southern Railway Extensions.—Notice is given in *The London Gazette* under the date March 25 that the Brazil Great Southern Railway Extensions Limited has been struck off the register of companies pursuant to Section 295 (5) of the Companies Act, 1929.

British Bulb Fields.—The L.N.E.R. has arranged to run a half-day buffet car excursion to Spalding every Sunday in April and May to enable Londoners to see the Lincolnshire bulb fields in bloom. The train will leave King's Cross at 10.10 a.m., and the fare will be 5s. 9d., or, including a road tour of the bulb fields, 7s. 6d.

London Transport: New Telephone Number.—The telephone number of "55, Broadway" has been Victoria 6800 for some 30 years. Tomorrow, April 2, it will change to Abbey 1234. By courtesy of the Post Office, the London Passenger Transport Board was enabled to reserve this readily-remembered number before the Abbey exchange was established.

Express Collision near Jubbulpore, Great Indian Peninsula Railway.—A Reuters message, dated March 20, reports that on Sunday night the Allahabad-Bombay express collided with a goods engine about 75 miles from Jubbulpore, the driver and fireman of the express being killed and 19 other people injured. A paragraph in *The Times* suggests that the goods engine had been sent to retrieve a wagon which had run away during shunting operations, and that the express hit both wagon and engine.

Locomotive Work on the Est.—Two slight errors, brought to our notice by Baron Vuillet, appeared in the description, in the March 11 issue, of locomotive performance over the Est main line in France. The gradient east of Nogent-sur-Seine, negotiated by the Paris-Orleans 4-8-0 and the Nord 2-10-0 on the test runs with fast freight trains, is 1 in 166 and not 1 in 110; furthermore, it is 4½ and not 1½ miles long. Also the Nord 2-10-0 consumed 30 and 29·2 gals. of water per km., and not per mile, which brings these figures up to 48·3 and 47 gals. respectively per mile.

"Save to Travel" on the Great Southern Railways.—The "Save to Travel" scheme on the Great Southern Railways, Eire, announced by the Chairman in his speech at the annual meeting (see page 497, March 11), will be inaugurated today, April 1. Savings stamps, value 1s., will be on sale at all G.S.R. offices, for affixing to cards having spaces for 26 stamps. Cards, wholly or partly stamped, will be accepted at their face value in payment or part payment for a railway ticket or tickets to the value of 2s. 6d. or over.

Collision Near Valencia.—A Reuters message from Barcelona reports that 23 persons were killed when a train collided with a lorry at a level crossing near Valencia. The deaths were caused by the petrol igniting and setting fire to the train.

B.T.-H. and Railway Electrification.—At the recent annual meeting of the British Thomson-Houston Co. Ltd., the Chairman, Mr. William C. Lusk, said that among the interesting contracts completed during the year in which the company participated were the electrification of the Wirral lines of the L.M.S.R., the Tyneside line of the L.N.E.R., the Randfontein-Springs line at Johannesburg, and the extension of the Natal main line of the South African Railways.

New Road-Rail Heated Tanks.—A demonstration took place at Euston station on Wednesday of a new departure in road-rail tanks, built by the L.M.S.R. in conjunction with R. A. Dyson & Co. Ltd., of Liverpool, for the conveyance of edible oils in bulk on behalf of the margarine executive of Lever Bros. and Unilever Limited, from the refineries to the factories. An interesting feature is that the insulated road trailers are electrically heated while on the rail vehicle from a generator driven by one of the rail axles.

Serious Derailment in New Zealand.—The most serious accident for 15 years on the New Zealand Government Railways occurred about 2 a.m. on March 26, when a passenger train bound for New Plymouth, in the North Island, became derailed on a falling gradient near Ratana, 20 miles south of Wanganui. Some 180 week-end excursionists were travelling by the train, and six people were killed and 30 injured, including the engine crew. Three coaches were telescoped and a fourth broken up. A special commission is holding an inquiry into the cause of the derailment.

L.N.E.R. and Southern Proposed Pool.—Notice is given by the L.N.E. and Southern Railway Companies that they are proposing to enter into an agreement for pooling certain of their receipts from the carriage of merchandise traffic between Great Britain and the Continent and that they have applied to the Minister of Transport for his consent to such agreement so far as it relates to such receipts by rail in Great Britain. The undertakings given by the four amalgamated railways in 1934 in relation to the agreement between those companies for the pooling of certain receipts from parcels, excess luggage and parcels post, will apply to the proposed agreement on the understanding that such undertakings are limited exclusively to the railways of the L.N.E. and Southern Companies respectively and to the staff employed in connection therewith.

New Haven RR. Safety Record.—Not a single passenger of the New York, New Haven & Hartford Railroad was killed during 1937 from any cause, and the company on December 31 completed its sixth successive year without incurring a single passenger fatality in a train accident, during which time more than 200,000,000 passengers were carried. Only two passengers of the 1,414,000,000 carried by the New Haven since April, 1916, have been killed in a train accident.

Canadian Pacific Earnings.—Gross earnings of the Canadian Pacific Railway for the month of February, 1938, amounted to $9,383,000, a decrease of $342,000 in comparison with February, 1937. In the working expenses of $9,059,000 there was an increase of $325,000, leaving net earnings $667,000 lower, at $324,000. Aggregate gross earnings for the first two months of 1938 were $19,698,000, a decrease of $221,000, and the net earnings of $881,000 showed a fall of $1,023,000.

Canadian National Earnings.—For the month of February, 1938, gross earnings of the Canadian National Railways were $13,289,721, a decrease of $1,012,135 in comparison with February, 1937. Operating expenses ($14,636,940) showed an increase of $806,978, with the result that there was a deficit of $1,347,219, against net earnings of $471,894. Aggregate gross earnings for the first two months of 1938 amounted to $26,611,353, a decrease of $1,733,855, and, as against net earnings of $555,116 for the first two months of 1937, there was a deficit on working of $2,857,973.

New Bridges across Euphrates.—A Reuters message from Ankara reports that a second bridge, 1,080 ft. long, is being built over the River Euphrates by the Turkish Ministry for Public Works; it will be an essential link between Sivas and Erzerum and the Iranian frontier. It is hoped that the bridge, which is to carry both railway and road traffic, will be completed in the near future, and before the torrential spring rains begin. Other bridges will be built across the Euphrates soon, to cater for the increased traffic expected to result from the Turko-Iranian agreement signed last year. It has been forecast that most of the transit trade from Iran, which hitherto passed through Bahrein, Iraq, and Syria, would revert to Turkey.

Presidential Committee to Report on the Rehabilitation of American Railroads.—A Reuters message from Washington says that before concluding the second railway conference there on March 18—as foreshadowed in these columns of our issue of March 18—President Roosevelt appointed a committee of three members of the Inter-State Commerce Commission to study a programme of rehabilitation for the railroads. The Committee is to report to him by Thursday next, after which the conferences will be

resumed. The Chairman of the I.C.C. said that particular stress was laid on railroad consolidation, with the consensus of opinion that large savings could thereby be realised. The special committee said it had been called upon to give the President complete, factual recommendations for immediate action by Congress in regard to the whole railroad situation, which was critical. The Chairman of the I.C.C. indicated that the crux of the programme, which had already been tentatively devised, was the creation of a special transportation board.

Activity at Southampton Docks.—The fruit trade has been particularly heavy at Southampton this year, and in one week approximately 461,000 packages were received from South Africa alone. Southampton deals with the whole of the deciduous fruit traffic from South Africa to the United Kingdom, which in 1937 amounted to 3,424,000 packages. Quick despatch of fruit is a feature of fruit handling at Southampton; when a recent consignment of bananas arrived from the West Indies, discharge was begun at 8.0 a.m. and two special trains had been despatched for the Bournemouth and Portsmouth areas by noon. Empire trade at Southampton has increased by as much as 517 per cent. from Australia, and 199 per cent. from Canada in five years. Flower traffic from Guernsey is another heavy item, some 410,000 boxes having been despatched from the docks by rail last year.

New Locomotives for the Twentieth Century Limited.—The first of ten streamlined Hudson type locomotives for hauling the new streamlined Twentieth Century Limited, of the New York Central System, between New York and Chicago has recently been delivered and has developed in track tests a cylinder horsepower of more than 4,700 at 75 m.p.h. At 80 m.p.h. a drawbar pull of 17,500 lb. was recorded. Reduction in the weight of the revolving and reciprocating parts has resulted in a 50 per cent. decrease in the hammer blow at high speeds. The new locomotives have been built by the American Locomotive Company.

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 12th Week			Totals to Date		
	1938	1937	Inc. or Dec.	1938	1937	Inc. or Dec.
L.M.S.R. (6,855½ mls.)	£	£	£	£	£	£
Passenger-train traffic...	419,000	639,000	– 220,000	4,711,000	4,839,000	– 128,000
Merchandise, &c. ...	489,000	432,000	+ 57,000	5,852,000	5,747,000	+ 105,000
Coal and coke ...	252,000	257,000	– 5,000	3,621,000	3,467,000	+ 154,000
Goods-train traffic ...	741,000	689,000	+ 52,000	9,473,000	9,214,000	+ 259,000
Total receipts	1,160,000	1,328,000	– 168,000	14,184,000	14,053,000	+ 131,000
L.N.E.R. (6,315 mls.)						
Passenger-train traffic...	265,000	384,000	– 119,000	3,117,000	3,196,000	– 79,000
Merchandise, &c. ...	359,000	303,000	+ 56,000	4,112,000	3,932,000	+ 180,000
Coal and coke ...	250,000	224,000	+ 26,000	3,336,000	3,130,000	+ 206,000
Goods-train traffic ...	609,000	527,000	+ 82,000	7,448,000	7,062,000	+ 386,000
Total receipts	874,000	911,000	– 37,000	10,565,000	10,258,000	+ 307,000
G.W.R. (3,737 mls.)						
Passenger-train traffic...	169,000	268,000	– 99,000	1,963,000	2,035,000	– 72,000
Merchandise, &c. ...	202,000	181,000	+ 21,000	2,391,000	2,279,000	+ 112,000
Coal and coke ...	114,000	112,000	+ 2,000	1,500,000	1,425,000	+ 75,000
Goods-train traffic ...	316,000	293,000	+ 23,000	3,891,000	3,704,000	+ 187,000
Total receipts	485,000	561,000	– 76,000	5,854,000	5,739,000	+ 115,000
S.R. (2,147 mls.)						
Passenger-train traffic...	259,000	391,000	– 132,000	3,101,000	3,153,000	– 52,000
Merchandise, &c. ...	65,000	54,500	+ 10,500	715,500	696,000	+ 19,500
Coal and coke ...	33,000	32,500	+ 500	446,500	425,000	+ 21,500
Goods-train traffic ...	98,000	87,000	+ 11,000	1,162,000	1,121,000	+ 41,000
Total receipts	357,000	478,000	– 121,000	4,263,000	4,274,000	– 11,000
Liverpool Overhead ... (6½ mls.)	1,237	1,107	+ 130	16,042	14,024	+ 2,018
Mersey (4½ mls.) ...	4,426	4,117	+ 309	51,974	50,232	+ 1,742
*London Passenger Transport Board ...	569,700	542,400	+ 27,300	21,895,200	21,767,600	+ 127,600
IRELAND						
Belfast & C.D. pass. (80 mls.)	1,728	1,744	– 16	20,207	19,526	+ 681
,, ,, goods	474	512	– 38	5,279	5,924	– 645
,, ,, total	2,202	2,256	– 54	25,486	25,450	+ 36
Great Northern pass. (543 mls.)	7,350	10,200	– 2,850	96,600	93,950	+ 2,650
,, ,, goods	10,200	11,300	– 1,100	103,900	109,450	– 5,550
,, ,, total	17,550	21,500	– 3,950	200,500	203,400	– 2,900
Great Southern pass. (2,076 mls.)	26,663	33,498	– 6,835	333,344	326,525	+ 6,819
,, ,, goods	40,580	45,783	– 5,203	481,484	508,238	– 26,754
,, ,, total	67,243	79,281	– 12,038	814,828	834,763	– 19,935

* 39th Week (before pooling) Good Friday, 1937

British and Irish Railway Stocks and Shares

Stocks	Highest 1937	Lowest 1937	Prices Mar. 30, 1938	Prices Rise, Fall
G.W.R.				
Cons. Ord. ...	67⅜	55¾	53	–2½
5% Con. Prefce. ...	127	108	114½	+1
5% Red. Pref. (1950)	113	109	108½	—
4% Deb.	113⅝	102½	108	+½
4½% Deb.... ...	118	106	108½	—
4½% Deb.	124½	112	116½	—
5% Deb.	136½	122¾	129½	—
2½% Deb.... ...	76	64	67½	—
5% Rt. Charge ...	133 7/16	118	126½	—
5% Cons. Guar. ...	133¾	116½	124½	—
L.M.S.R.				
Ord.	36⅛	25⅜	20½	–1
4% Prefce. (1923)	82½	65¾	57	–2
4% Prefce. ...	92½	77¾	75	–½
5% Red. Pref. (1955)	107¾	102	102	—
4% Deb.	108	99¼	102½	+½
5% Red. Deb. (1952)	117½	111	113½	—
4% Guar. ...	104	95⅞	98½	+½
L.N.E.R.				
5% Pref. Ord. ...	12½	6¾	5¾	–½
Def. Ord.	6¼	3⅝	3	–⅝
4% First Prefce.	79½	63	57	–1½
4% Second Prefce.	31½	21	21	–1
5% Red. Pref. (1955)	101¼	89¾	88½	—
4% First Guar. ...	103	91⅞	94½	—
4% Second Guar.	97⅝	85½	84	+½
3% Deb.	84⅛	74	76	+½
4% Deb.	107¼	98½	101	+½
5% Red. Deb. (1947)	113½	106½	107½*	—
4½% Sinking Fund Red. Deb.	110 5/16	105½	107	—
SOUTHERN				
Pref. Ord.... ...	98⅝	83½	75	–1
Def. Ord.	27⅞	16¾	18½	–1
5% Pref.	126 1/16	105 15/16	113½	+1
5% Red. Pref. (1964)	118	110¼	113½	—
5% Guar. Prefce.	133¾	116¾	124½	—
5% Red. Guar. Pref. (1957)	118½	111½	114	—
4% Deb.	112	101¼	106	—
5% Deb.	135¾	123½	127½	—
4% Red. Deb. 1962–67	113	105	107	—
BELFAST & C.D.				
Ord.	5	4	4½	—
FORTH BRIDGE				
4% Deb.	106	99½	100½	—
4% Guar. ...	105¾	99	100½	—
G. NORTHERN (IRELAND)				
Ord.	11	5	5½	+⅛
G. SOUTHERN (IRELAND)				
Ord.	50	21½	20	—
Prefce.	61	34	30	—
Guar.	94¾	69½	54½	–3½
Deb.	95	82⅛	79¾	–1¼
L.P.T.B.				
4½% "A" ...	123¾	110½	117½	—
5% "A" ...	135	121½	127½	—
4½% "T.F.A." ...	108¾	104	105	—
5% "B" ...	125	114½	120½	—
"C"	99¾	75	79½	—
MERSEY				
Ord.	42⅝	22	21	—
4% Perp. Deb. ...	103	96¾	100	—
3% Perp. Deb. ...	77⅝	74½	74½	—
3% Perp. Prefce.	68¾	61¼	63	+1

* ex dividend

CONTRACTS AND TENDERS

The North British Locomotive Co. Ltd. has received orders from the Crown Agents for the Colonies for six 4-6-2 type Class "O1" locomotives and tenders, and six 4-6-4 type Class "C2" tank locomotives for the Federated Malay States Railways.

Ateliers de la Dyle has received orders from the Morvi Railway to the inspection of Messrs. Robert White & Partners for 30 four-wheeled wagons for salt traffic and six bogie timber trucks, metre gauge.

Alfred Herbert (India) Limited has received orders from the Indian Stores Department for two high-power universal milling machines complete with standard equipment and outfit of tools; one 3-ft. and one 3-ft. 6-in. radial drilling, boring, tapping, and studding machine, complete; one 12½-in. by 12-ft. and one 12½-in. by 16-ft. sliding, surfacing, and screwcutting gap bed lathe with back shaft, complete; one 7-in. by 6-ft. 6-in. all-geared head sliding, surfacing, and screwcutting vee bed gap lathe, complete; three 7½-in. by 8-ft. sliding, surfacing, and screwcutting vee bed gap lathes with front feed shaft complete; one 22-ft. high-speed shaping machine, complete; one 24-in. rapid production single boring and turning mill, complete; one 13-in. by 16-ft. general purpose heavy duty backgeared sliding, surfacing, and screwcutting gap bed lathe with back feed shaft, complete.

The London Passenger Transport Board has placed contracts with Kinnear Moodie & Co. and Balfour Beatty & Co. Ltd., for the supply of 48,000 segments and 8,000 keys (small segments) of reinforced concrete for the construction of a section of the Central Line tube in north-east London. The value of the contract is about £72,000.

Taylor Bros. & Co. Ltd., has received an order from the Antofagasta (Chile) & Bolivia Railway for 124 locomotive tyres.

Associated British Machine Tool Makers Limited has received an order from the Indian Stores Department, for the supply of one double-welded portable locomotive horn-cheek grinding machine.

W. & T. Avery Limited has received an order from the Stores Purchase Committee, Government of Mysore, Bangalore, for one 10-cwt. platform weighing machine.

Greaves, Cotton & Co. Ltd., has received an order from the Indian Stores Department for three oil-engine-driven generating sets.

The Bengal-Nagpur Railway Administration has placed the following orders:—

Ingersoll Rand Co. Ltd.: Two aftercoolers.
John Baker & Bessemer Limited: 302 Steel locomotive tyres.
Superheater Co. Ltd.: A quantity of superheater elements and headers.
Imperial Chemical Industries Limited: One degreasing plant.

The Indian Rubber Manufacturers Limited has received orders from the Indian Stores Department for 23,500 buffing springs.

The British India Electric Construction Co. Ltd., has received orders from the Indian Stores Department for a total of 338 a.c. ceiling fans.

The Madras & Southern Mahratta Railway Administration has placed the following orders to the inspection of Messrs. Rendel, Palmer & Tritton:—

Thos. Firth & John Brown Limited: 2,400 helical springs.
J. O'Hara Murray & Company, as agents for Rheinmetall-Borsig A.G.: 60 steel locomotive tyres.
Böchumer Verein A.G.: 280 steel locomotive tyres.

Usines a Cuivre et a Zinc de Liége has received an order from the Great Indian Peninsula Railway through Heatly & Gresham Limited, for the supply of 14 flanged copper tube plates and six flanged copper back plates for 5-ft. 6-in. gauge locomotives.

Werkspoor N.V. has received orders from the Mysore State Railways Administration to the inspection of Messrs. Rendel, Palmer & Tritton for one bogie carriage underframe 56 ft. long over headstocks and 7 ft. wide over solebars; five four-wheeled brakevan and five horsebox and luggage van underframes, 21 ft. 6 in. long over headstocks, 7 ft. 6 in. wide over solebars and with a 12-ft. wheelbase. All the above underframes are to be supplied complete with wheels and axles and vacuum brake gear.

The Vulcan Foundry Limited has received an order from the Bengal-Nagpur Railway Administration for 13 HSM class locomotive boilers.

The Crown Agents for the Colonies have recently placed the following orders:—

Wellington Tube Works Limited: Pipe valves.
Mechans Limited: Piping.
Newport & South Wales Tube Co. Ltd.: Poles.
Anderston Foundry Co. Ltd.: Rail clips; sleeper keys.
F. Theakston (1933) Limited: Railway track.
British Thomson-Houston Co. Ltd.: Receiving sub-station.
T. Turton & Sons Limited: Steel bars.
Horseley Bridge & T. Piggott Limited: Steel building.
British Steel Piling Co. Ltd.: Steel piling.
Braithwaite & Co. (Engineers) Ltd.: Steelwork.
A. Findlay & Co. Ltd.: Steelwork.
Head, Wrightson & Co. Ltd.: Steelwork.
Standard Telephones & Cables Limited: Telephone equipment.
Ericsson Telephones Limited: Telephones.
Brush Electrical Engineering Co. Ltd.: Transformers.
J. Baker & Bessemer Limited: Tyres.
Brown Bayley's Steel Works Limited: Tyres.
Spencer Wire Co. Ltd.: Wire.
J. Wilkes Sons & Mapplebeck Limited: Wire.

Tenders are invited by the Bengal & North Western Railway, receivable by April 26, at 237, Gresham House, Old Broad Street, London, E.C.2., for the supply of two motor-driven air compressors.

Tenders are invited by the Mysore Government Stores Purchase Committee, receivable by Messrs. Rendel, Palmer & Tritton, 55, Broadway, Westminster, S.W.1, by May 23, for the supply of locomotive carriage and wagon spare parts required during the year 1938–39.

Tenders are invited by the Bombay, Baroda & Central India Railway, receivable by April 13, at the White Mansion, 91, Petty France, Westminster, S.W.1, for the supply of copper firebox plates.

Tenders are invited by the Chief Controller of Stores, Indian Stores Department (Miscellaneous Section), New Delhi, receivable by May 2, for the supply of metallic body fittings for railway carriages required for the E.I., E.B. and G.I.P. Railways during the period September 16, 1938–September 15, 1939.

STEEL BARS AND WIRE FOR CONCRETE REINFORCEMENT.—A new British Standard Specification, No. 785-1938, for rolled steel bars and hard drawn steel wire for concrete reinforcement has been issued. Copies may be obtained from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 2d. post free.

NICKEL APPLICATIONS ON THE SCREEN.—The Bureau of Information on Nickel, of Thames House, Millbank, London, S.W.1, has produced a 16-mm. silent film entitled "Nickel Alloy Structural Steels." It illustrates applications of nickel steels in the automobile, aircraft, coal mining, marine engineering, and several other industries. Special sequences devoted to manufacturing processes and outstanding engineering achievements have been photographed with the close co-operation of twenty or more important firms, and these include a variety of subjects ranging from coal mining practice to the engine room of the *Queen Mary*. The film is primarily for the use of engineering societies, which may obtain it free on request from the bureau.

NO DANGER OF ALUMINIUM SHORTAGE.—Dr. William Cullen's warning, in his Presidential address at the annual meeting of the Institution of Chemical Engineers on February 18, that the world's supply of metals was, in some instances, "getting woefully short," has brought a reply from the Aluminium Information Bureau, in which it is pointed out that aluminium is, with the exception of silicon, the most abundant metal in the world, being an important constituent of all common rocks, clay, and various soils. Supplies of the raw material from which aluminium is produced, the clay bauxite, are virtually inexhaustible, and large deposits occur throughout the world. Modern research on aluminium and its alloys has shown that it can now be used in place of other metals for almost every purpose. If a widespread shortage of metals became apparent, it is safe to say that the world production of aluminium, which, for 1937, is estimated at approximately 500,000 tons, could be considerably and rapidly increased.

OFFICIAL NOTICES

Sudan Government

SUDAN RAILWAYS require a Signal and Tablet Inspector, age 25-30 years, preferably unmarried. Candidates should have had workshop and outdoor experience in the maintenance and renewal of Signalling installations, Tablet, Telephone and Telegraph instruments on a Single-Line Railway operated on a Block system with token instruments. Preference will be given to candidates able to prepare diagrams, interlocking tables and working charts.

Starting rate of pay £E360 per annum with periodical increases in accordance with Government Scales, viz., £E360—396—432—480—540—600, the first two increases being biennial, and after that triennial. (£E1 = £1 0s. 6d.)

The successful candidate will subscribe to the Provident Fund on appointment, with a possibility of being offered permanent and pensionable service if later he is selected to fill a post in a higher scale.

Free passage on appointment. Strict medical examination.

Applications giving full particulars as regards age, qualifications and experience, together with copies of testimonials, should be sent to the Controller, Sudan Government London Office, Wellington House, Buckingham Gate, London, S.W.1, marking envelope "Signal Inspector."

WANTED for India, Carriage and Wagon Estimator for large firm of Rolling Stock builders. Applicants must have held a similar post, and be of good general and technical education. Single men about 25-30 years of age with drawing office experience preferred. Salary approximately £45 per month, five-year agreement, provident fund, free passages, and home leave on re-engagement. Apply, by letter, stating age and whether married or single, to: "AXLEBOX," c/o ABBOTTS, Eastcheap, London, E.C.3.

WANTED for British Railway in Argentine Republic—Under Foreman Moulder for Foundry with an output of some 400 tons of iron castings and 80 tons of non-ferrous castings per month. Applicant should give full particulars of experience, salary expected, &c. Age must not exceed 30 years.—Write "A.B.," c/o STREETS, 6, Gracechurch Street, E.C.3.

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The Castlecary Accident

The trial opened on March 30, before the Lord Justice Clerk (Lord Aitchison), at the High Court of Justiciary, Edinburgh, of David James Anderson, the driver of the Edinburgh—Glasgow express which ran into another passenger train at Castlecary, L.N.E.R., on December 10, 1937, resulting in the death of 35 persons and injuries to about 100. The charge was one of culpable homicide, on the following indictment:—

"The charge against you is that on December 10, 1937, while driving the engine of an express passenger train on the London & North Eastern Railway from Edinburgh towards Glasgow you did fail to reduce speed at the 'down' distant signal situated on said railway about 777 yards east of the signal cabin at Castlecary, said 'down' distant signal being at 'Caution' when you reached it, and you did therefore fail to proceed cautiously and be prepared to stop at the 'down' home signal situated near said cabin on said railway and guarding Castlecary station, and you did fail to bring said engine and train to a stand at the said 'down' home signal, said 'down' home signal being at 'Danger' when you reached it; and you did drive said engine and train past the said 'down' home signal and through Castlecary station at a high rate of speed, and you did cause said engine and train to collide with another passenger train then stationary on said railway about 330 yards west of said 'down' home signal, and you did kill the persons named in the list of persons killed annexed hereto, then on one or other of the said trains, and you did cause personal injuries to be sustained by the persons mentioned in the list of persons injured annexed hereto, then on one or other of the said trains."

The accused had been formally charged on March 19 at the Sheriff Court, Dumbarton, the Procurator Fiscal, Mr. John Binnie, appearing as prosecutor for the Crown, when Mr. Peter Weir, S.S.C., of Edinburgh, formally tendered a plea of not guilty on Anderson's behalf.

Castlecary itself is in Stirlingshire, but the station and scene of the accident are in Dumbarton, bringing the case under the jurisdiction of the authorities of that county.

Mr. T. M. Cooper, K.C., M.P., the Lord Advocate, and Mr. J. Wellwood Johnston, the Advocate Depute, appeared for the prosecution, and Mr. D. P. Blades. K.C., and Mr. W. R. Walker for the defence.

Medical evidence was given that the dead were likely to have been killed instantaneously.

In the course of evidence it was stated that the Dundee train, into which the express ran, had itself overrun the Castlecary signals, though it had stopped just beyond the station.

The Judge asked the Castlecary signalman whether the fact that both the Dundee and the Edinburgh trains overran the signals did not suggest that something was wrong with the signals, and the witness replied that it did. In cross-examination he said that he had never heard of the distant signal drooping to such an extent that the driver would take it to be in the clear position.

The Judge.—If your distant signal was not acting properly, so that both these experienced drivers did not slow down, that would account for the accident, wouldn't it?—Yes.

The stationmaster, Mr. W. G. Scott, said that when he went to the signal cabin the levers were all in the position indicating that the signals should have been at danger or caution.

As we go to press we learn that a verdict of not guilty was given and Driver Anderson was discharged.

G.W.R. (London) Musical Society Concert

On Friday last, March 25, members of the G.W.R. (London) Musical Society, augmented by the Swindon choir and orchestra, presented their annual smoking concert at the Queen's Hall. In the principal item of the programme, a concert version of "The Rebel Maid," they were assisted by Miss Olive Groves, Mr. George Baker, Miss Freda Townson, Mr. James Topping, and Mr. Topliss Green. The conductor, Mr. W. H. Reed, who was for many years leader of the London Symphony Orchestra, put to effective use the first-class material at his disposal. A variety programme followed, to which the soloists and Mr. Arthur Prince, the well-known ventriloquist, contributed, and the grand *finale*—the March from "Tannhauser" provided by the choir and orchestra, set the seal on an excellent entertainment.

Lord Palmer, the President of the society was in the chair and others present included: Viscount Horne of Slamannan, the Hon. A. W. Baldwin, Messrs. F. R. E. Davis, F. R. Potter, R. Carpmael, A. S. Quartermaine, C. R. Dashwood, W. J. Thomas, F. C. A. Coventry, and R. A. P. Setterfield.

The Great Western Musical Society was founded in 1902. Prior to the war its concerts were given in the General Meeting Room at Paddington station, but since 1920 it has been the practice for one concert every year to be held at the Queen's Hall. At all of the concerts in this hall, the society has been augmented by the Swindon choir and orchestra, and Lord Palmer has presided over the gatherings without intermission. The combined London and Swindon choirs and orchestras numbering nearly 250 performers, rehearse weekly throughout the winter at their respective stations and, except for soloists, no professional assistance is enlisted for concerts.

In promoting the annual concert at the Queen's Hall, the society has the support of the following G.W.R. Headquarters' organisations: the Athletic, Debating, Dramatic, Literary, and Operatic societies, and the Rifle Club. The Chairman of the concert committee is Sir James Milne. Lord Palmer is a generous benefactor of British music; the best known example of his philanthropy in this direction is the Royal College of Music Patron's Fund, which he founded.

Railway Share Market

A further movement to lower values has been in evidence in the stock and share markets this week. Sentiment was dominated by the reaction of Wall Street markets and by liquidation from Paris and other Continental centres, while owing to the disposition to await the Budget, the lower prices failed to attract buyers. Later, however, the general tendency appeared less unsettled and in some sections earlier losses were partly regained.

Home railway stocks made lower prices in view of the general trend and the disappointment with the decrease shown by the past week's traffics, although it is recognised that the latter compare with receipts for the pre-Easter week of last year. The reaction was, of course, most marked in the ordinary and junior preference stocks, but debentures and prior-charges were easier in tone in line with British Government securities. Nevertheless, the 4 per cent. debentures of the Great Western and Southern at 108½ and 106½ respectively have both regained earlier small losses, as have L.N.E.R. 3 per cent. debentures at 76.

Great Western ordinary stock, which was 55¼ earlier in the week, subsequently reacted to 53½. L.M.S.R. ordinary also went back sharply and at one time changed hands at 20, but later showed fractional improvement. The 1923 preference stock of the last-named railway lost a point to 57½, while the 4 per cent. preference was also lower at 75½. L.N.E.R. 4 per cent. first preference was fairly steady around 57½. The decline in this case was relatively moderate, while the second preference changed hands at 21. Southern deferred moved down to 18¼ and the preferred, after having a fairly steady appearance at 76, reacted to 74¾, although, as in the case of the other main line railways, it is expected that the current week's traffic figures will be of a more encouraging character. London Transport "C" was steady at 79½.

Sharp movements against holders were shown in the Argentine railway market, not only by preference and ordinary stocks, but also by the debentures. Although sentiment is influenced by the poor crop prospects, current prices would appear more than to discount the adverse factors in the position, particularly in the case of the debentures of the leading companies, but it is doubtful if the latter have much scope for improvement until the trend of general market conditions is reversed. San Paulo and Nitrate Rails ordinary have declined. In other directions, American railway stocks were affected by the reaction of Wall Street markets.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

	Railways	Miles open 1937–38	Week Ending	Traffics for Week: Total this year	Traffics for Week: Inc. or Dec. compared with 1937	No. of Weeks	Aggregate Traffics to Date: Totals: This Year	Aggregate Traffics to Date: Totals: Last Year	Aggregate Traffics to Date: Increase or Decrease	Shares or Stock	Prices: Highest 1937	Prices: Lowest 1937	Prices: Mar. 30, 1938	Yield % (See Note)
				£	£		£	£	£					
South & Central America	Antofagasta (Chili) & Bolivia	834	27.3.38	18,970	+ 2,850	13	211,650	207,670	+ 3,930	Ord. Stk.	29	10¼	8½	Nil
	Argentine North Eastern ..	753	26.3.38	7,605	— 782	39	356,366	338,987	+ 17,379	,,	19¼	8	3	Nil
	Argentine Transandine ..	—	—	—	—	—	—	—	—	A. Deb.	93½	60	75	5
	Bolivar	174	Feb., 1938	3,500	— 2,200	9	7,100	11,100	— 4,000	6 p.c. Deb.	9½	5	8½	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds.	17	9	6½	7⅛
	Buenos Ayres & Pacific ..	2,806	26.3.38	106,576	— 18,672	39	3,397,833	3,535,030	— 137,197	Ord. Stk.	17⅛	5½	5	Nil
	Buenos Ayres Central ..	190	12.3.38	$103,400	— $34,500	37	$4,436,500	$5,296,900	— $860,400	Mt. Deb.	41½	18	11½	Nil
	Buenos Ayres Gt. Southern	5,084	26.3.38	169,293	— 23 325	39	5,859,986	5,804,919	+ 55,067	Ord. Stk.	33¾	13½	10	Nil
	Buenos Ayres Western ..	1,930	26.3.38	45,471	— 11,043	39	1,771,774	1,884,444	— 112,670	,,	31¾	11¼	7½	Nil
	Central Argentine	3,700	26.3.38	103,703	— 62,017	39	4,798,773	5,932,366	— 1,133,593	,,	34¼	10¾	8	Nil
	Do.	—	—	—	—	—	—	—	—	Dfd.	20½	4½	5	Nil
	Cent. Uruguay of M. Video	980	19.3.38	19,010	+ 1,537	38	678,885	660,942	+ 17,943	Ord. Stk.	67/32	2	2½	Nil
	Cordoba Central	1,218	—	—	—	—	—	—	—	Ord. Inc.	6¼	1½	1½	Nil
	Costa Rica	188	Jan., 1938	23,350	+ 9,176	31	178,556	125,108	+ 53,448	Stk.	38	27	27½	7¼
	Dorada	70	Feb., 1938	14,700	— 1,100	9	32,400	31,100	+ 1,300	1 Mt. Db.	107	106	106	5/8
	Entre Rios	810	26.3.38	14,001	+ 3,126	39	562,711	505,618	+ 57,093	Ord. Stk.	19 7/16	6	5	Nil
	Great Western of Brazil ..	1,092	26.3.38	7,100	+ 800	13	108,400	108,500	— 2,100	Ord. Sh.	5/4	1/8	1/4	Nil
	International of Cl. Amer...	794	Jan., 1938	$487,142	— $28,797	5	$487,142	$513,939	— $26,797	—	—	—	—	—
	Interoceanic of Mexico ..	—	—	—	—	—	—	—	—	1st Pref.	2/-	1/-	1/2	Nil
	La Guaira & Caracas ..	22§	Feb., 1938	4,970	+ 45	9	9,580	11,195	— 1,615	Stk.	8½	6	8½	Nil
	Leopoldina	1,918	26.3.38	19,797	— 2,891	13	236,313	278,752	— 42,439	Ord. Stk.	9¼	3	2½	Nil
	Mexican	483	21.3.38	$321,100	+ $50,500	12	$3,565,600	$3,583,300	— $17,700	,,	1½	1/4	5/8	Nil
	Midland of Uruguay ..	319	Feb., 1938	10,547	+ 2,059	35	75,858	69,474	+ 6,384	,,	1⅞	1/2	1/2	Nil
	Nitrate	384	15.3.38	8,449	— 62	11	39,775	38,302	+ 1,473	Ord. Sh.	31/16	2	1⅞	Nil
	Paraguay Central	274	26.3.38	$2,423,000	— $1,685,000	39	$120,434,000	$106,306,000	+ $14,128,000	Pr. Li. Stk.	84	79¼	72½	8¼
	Peruvian Corporation ..	1,059	Feb., 1938	72,537	— 1,764	35	660,322	644,887	+ 15,435	Pref.	14⅝	4½	3	Nil
	Salvador	100	19.3.38	£25,050	— £14,700	38	£759,725	£850,008	— £90,283	Pr. Li. Db.	23½	21½	22½	Nil
	San Paulo	153½	20.3.38	30,149	— 1,166	12	334,464	349,102	— 14,698	Ord. Stk.	98½	56	42½	11¾
	Taltal	160	Feb., 1938	1,840	— 1,600	35	30,670	27,930	+ 2,740	Ord. Sh.	1 7/16	11/16	5/4	13 6/16
	United of Havana	1,353	26.3.38	45,960	— 12,429	39	953,698	986,837	— 33,139	Ord. Stk.	5⅝	31/32	2½	Nil
	Uruguay Northern	73	Feb., 1938	1,014	+ 138	35	7,434	8,492	— 1,058	Deb. Stk.	10	2	2	Nil
Canada	Canadian National	23,802	21.3.38	643,162	— 79,819	12	7,255,450	7,883,361	— 627,911	—	—	—	—	—
	Canadian Northern ..	—	—	—	—	—	—	—	— 4 p.c.	Perp. Dbs.	77	62½	63	6⅝
	Grand Trunk	—	—	—	—	—	—	—	—	4 p.c. Gar.	101⅞	94½	98½	4 1/16
	Canadian Pacific	17,186	21.3.38	482,800	— 34,200	12	5,363,600	5,532,000	— 168,600	Ord. Stk.	18	7¼	5½	Nil
India†	Assam Bengal	1,329	10.3.38	40,665	— 5,262	50	1,318,323	1,276,101	+ 42,222	Ord. Stk.	86	73½	78	3 13/16
	Barsi Light	202	10.3.38	4,192	+ 1,290	50	131,625	108,060	+ 23,565	Ord. Sh.	66½	46	57	8¾
	Bengal & North Western ..	2,107	10.3.38	84,194	— 20,972	23	1,247,648	1,332,350	— 84,702	Ord. Stk.	317	301	296½	6 1/16
	Bengal Dooars & Extension	161	10.3.38	3,480	+ 449	50	138,185	123,390	+ 14,795	,,	100	84	84½	7⅛
	Bengal-Nagpur	3,268	10.3.38	221,850	+ 2,965	50	6,667,025	5,831,463	+ 835,562	,,	101	89	91½	4⅝
	Bombay, Baroda & Cl. India	3,072	20.3.38	272,550	— 19,575	51	8,663,925	8,641,200	+ 22,725	,,	113	110½	110½	5 7/16
	Madras & Southern Mahratta	2,967	10.3.38	171,075	+ 17,766	50	5,234,008	5,189,178	+ 44,830	,,	110	105	105½	8 1/16
	Rohilkund & Kumaon ..	571	10.3.38	19,567	+ 9	23	245,845	259,885	— 14,040	,,	314	302	302½	5 15/16
	South Indian	2,531§	10.3.38	116,795	+ 6,917	50	3,952,695	3,777,688	+ 175,006	,,	103½	99½	101½	4 11/16
Various	Beira-Umtali	204	Jan., 1938	79,831	+ 17,093	18	356,561	268,806	+ 87,755	—	—	—	—	—
	Egyptian Delta	620	10.3.38	6,533	— 237	50	250,413	240,787	+ 9,626	Prf. Sh.	31/-	3/4	1/4	Nil
	Kenya & Uganda	1,625	Feb., 1938	248,923	— 25,925	9	522,477	569,087	— 46,610	—	—	—	—	—
	Manila	—	—	—	—	—	—	—	—	B. Deb.	48⅛	43½	48½	7 5/16
	Midland of W. Australia ..	277	Jan., 1938	13,642	+ 828	31	97,976	94,867	+ 3,109	Inc. Deb.	98	93½	93½	4¼
	Nigerian	1,900	12.2.38	53,245	— 24,902	46	2,514,793	2,185,523	+ 328,270	—	—	—	—	..
	Rhodesia	2,442	Jan., 1938	393,202	+ 66,276	18	1,710,441	1,365,254	+ 345,187	—	—	—	—	..
	South Africa	13,263	5.3.38	633,445	+ 14,575	49	31,238,183	29,662,420	+ 1,575,763	—	—	—	—	—
	Victoria	4,774	Dec., 1937	908,340	+ 18,053	26	—	—	—	—	—	—	—	—

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1/16

† Receipts are calculated @ 1s. 6d. to the rupee § ex dividend

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements are based on the current rates of exchange and not on the par value

Electric Railway Traction

Modern Suburban Trains

CONSIDERATION of the suburban lines which have been electrified during the past year or so in various parts of the world indicates how greatly the design and characteristics of the multiple-unit train have improved. As regards weight, both all-steel construction and more modern electrical equipment have contributed their quota, and there is also an improvement owing to the wider use of medium and high-tension d.c. (1,500 and 3,000 volts) for new schemes, compared with the almost universal 600-650 volts d.c. of the older electrified suburban lines. An excellent example of modern all-steel construction is to be found in the Wirral trains of the L.M.S.R. By the use of welding and the fabrication of the body framing and underframe as an integral unit, the tare weight of a trailer has been brought down to 20 tons, and that of a driving trailer to 21 tons; the motor-coach, with four nose-suspended traction motors, tares 36 tons. By the use of articulation, a weight-reducing method not favoured to a great extent in electric stock, the tare weight of one of the new L.N.E.R. twin-car 430 h.p. sets has been kept down to 56 tons, and here again the construction is largely of steel, although not welded throughout. Apart from the new stainless steel twin-car sets of the French National Railways, which have 20 h.p. per ton and 20 h.p. per seat, the usual run of modern multiple-unit suburban stock varies from 7 to 11 h.p. per ton of tare (on the one-hour rating) and from 2½ to 5 h.p. per seat. The Southern Railway normal three-car set has 10 h.p. per ton and 4·85 h.p. per seat, high values which are reduced when two of these rakes are coupled with two trailers between to form the rush hour eight-car train. This practice of the Southern is unusual, most railways coupling two or more identical motor-trailer sets for peak traffic. The Southern Railway practice differs also from that of the other railways included in the table on this page in that compartment stock is used in preference to open saloons, and with six to ten passengers standing in each compartment during the peak periods compared with the solid jam at the entrance vestibules of open stock, it is obvious that there is little to choose in the actual carrying capacity of the two types. Stainless steel construction has been used also for motor-trailer sets in Italy and for urban stock in America. Another innovation for electric stock, used only in urban services up to the present, but which may easily be extended to suburban trains, is the use of double-deck carriages. It is questionable, however, whether this gives any real increase in the carrying capacity. The rather startling characteristics of the twin-car trains of the French National Railways are due to their being designed to operate on both fast main-line and suburban traffic, and their acceleration rate over the lower speed range is 2·25 m.p.h.p.s.

More Southern Electrification Figures

SPEAKING to the members of the British Railway Stockholders Union recently, Mr. R. Holland-Martin, Chairman of the Southern Railway, stated that his company's policy of electrification had proved a gold mine, because of the large development of suburban London south of the Thames, for which probably it was largely responsible. The Southern Railway never put any conversion scheme in hand without fully considering the cost and what the results might be. Elaborate calculations were made as to the cost and the working expenses involved, and also as to the savings which might be made in the cost of working the old system. Unless the estimated return from the expected traffic greatly exceeded four per cent. on the capital expenditure involved plus the extra operating cost of the electric services over the existing steam services, the scheme was not carried out. In practice, the returns had proved to be well above the limiting value. On the Three Bridges, Brighton and Worthing electrification the return on the expenditure charged to capital account was 22½ per cent., and on the total expenditure 11 per cent. In the suburban area electrification had resulted in a return of approximately 27 per cent. on capital expenditure and 16 per cent. on total expenditure. The main-line conversions undertaken during the last five years, viz., to Brighton, Worthing, Eastbourne, Seaford, Hastings, and Portsmouth had been debited with about £4,500,000 in the capital account. Despite a twofold increase in train miles, the operating expenses had not increased appreciably, and the revenue had increased by £640,000 a year, equivalent to a 14 per cent. return on the capital expenditure. Incidentally, Mr. Holland-Martin mentioned that it had cost the Southern Railway £1,600,000 to convert the old L.B.S.C.R. overhead single-phase lines to low-tension d.c. with third rails.

CHARACTERISTICS OF RECENT MULTIPLE-UNIT SUBURBAN TRAINS

Railway	Gauge. Ft. In.	D.C. Voltage.	No. of Cars in Train	Tare Weight, Tons	H.P., One-hour Rating	No. of Seats	H.P. per Ton of Tare	H.P. per Seat
L.M.S.	4 8½	650	3	77	540	181	7·0	3·0
L.N.E.	4 8½	600	2*	56	432	128	7·7	3·35
Southern	4 8½	650	3	110	1,100	226	10·0	4·85
Do.	4 8½	650	2	71	550	161	7·1	3·4
New Zealand Govt. ..	3 6	1,500	2	58	660	141	11·4	4·7
Danish State	4 8½	1,500	2	74	650	141	8·8	4·6
French National ..	4 8½	1,500	2*†	66‡	1,330	132	20·0	10·0
Central of Brazil ..	5 3	3,000	3	124	700	212	5·6	3·3
Polish State	4 8½	3,000	3§	113	800	274	7·1	2·9
Bologna-Vignola ..	4 8½	3,000	2	38‡	300	125	7·9	2·4

* Articulated. † Used also for fast main line services. ‡ Stainless steel construction. § Partly articulated.

ELECTRIFICATION OF THE WIRRAL LINES

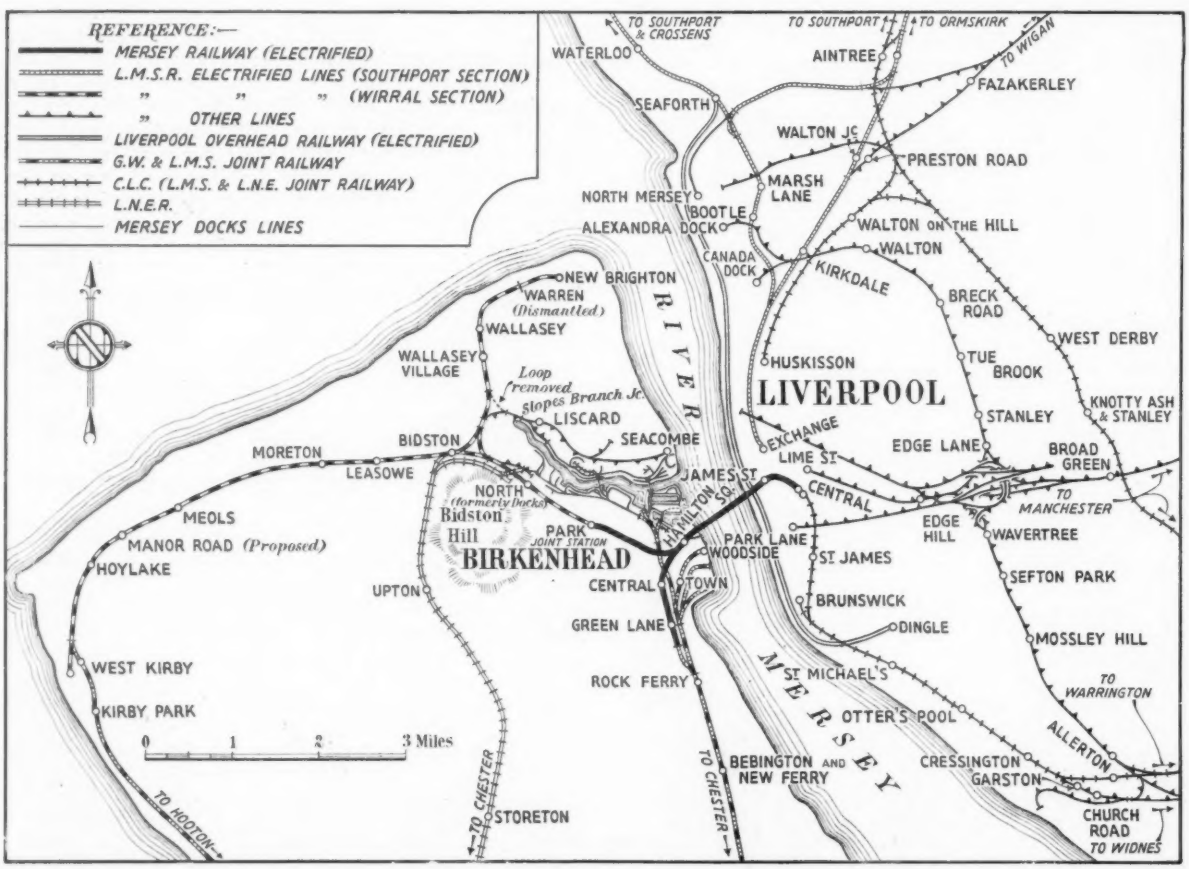
New L.M.S.R. development in Liverpool and Birkenhead suburban transport

IN 1863 the Hoylake Railway was incorporated with powers to make railways from Birkenhead and Seacombe to Hoylake. In 1881 the name of the company was changed to the Seacombe, Hoylake & Deeside Railway, and the line was extended to New Brighton in 1882. In the following year the Wirral Railway was incorporated to construct railways in the Wirral peninsula, communicating with the Mersey Railway, the Seacombe, Hoylake & Deeside Railway, and the extension of the Great Central Railway. Finally, in 1891, the Wirral and the Seacombe, Hoylake & Deeside companies were amalgamated under the name of the Wirral Railway. In 1900 the Wirral obtained powers to electrify its lines, but these powers were never exercised, although a sum of approximately a quarter of a million pounds was allotted on estimated capital expenditure.

Today the Wirral section of the L.M.S.R. is approached over a joint G.W.R. and L.M.S.R. line from Chester to West Kirby, and steam services have hitherto been run between Birkenhead Park and West Kirby, and Birkenhead Park and New Brighton, exchange being effected at Birkenhead Park with the electric services of the Mersey Railway. The Mersey Railway was opened for steam working in 1886, the original route being from James Street, Liverpool, to Green Lane, Birkenhead. It was electrified on the fourth rail system in 1903, and the nominal track voltage, 650 d.c., is the same as that adopted for the Wirral lines.

General

The electrification of the Wirral lines just completed has been carried out under the Government loan guarantee schemes of the Railways (Agreement) Act, 1935, and covers the whole of the Wirral section with the exception of the Seacombe branch, a total of 24 single track miles including sidings, and is on the 650-volt d.c. third rail system. Considerable expense has been avoided by the adoption of a system over which the existing Mersey stock with slight modifications could be used. Since the inauguration of electrification on March 14, a through service of trains has been operated to and from West Kirby, New Brighton, and Liverpool Central over the Mersey Railway tunnel, at a frequency of 10 min. during the morning and evening rush hours and also for a short period at midday, giving a 5-min. service between Birkenhead Park and Liverpool Central. In the slack hours a 15-min. service is run on each branch. The existing Mersey rolling stock operates the service between New Brighton



Map showing electrified lines in the vicinity of Liverpool, including the recently converted Wirral lines of the L.M.S.R.

Left: Switchgear, rectifier cubicles, and main transformer in Bidston substation. All the apparatus is remotely-controlled from Birkenhead North

Below: Reinforced concrete platform awning at the reconstructed station at New Brighton. In the background is one of the new L.M.S.R. electric trains

and Liverpool, but on Sundays the existing and the new will be intermixed.

In addition to residential facilities, New Brighton, Wallasey, West Kirby, and Hoylake attract a considerable amount of holiday and day pleasure traffic, which is capable of further development. Under electrification, there will be an increase of nearly 20 per cent. in the number of trains daily over the Wirral section, and nearly 50 per cent. increase in the number of services between it and Liverpool *via* Birkenhead Park. Furthermore, a standard timing of 29 min. stopping at all stations between West Kirby and Liverpool replaces the steam-worked average schedule of 36 min.

Civil Engineering and Signalling

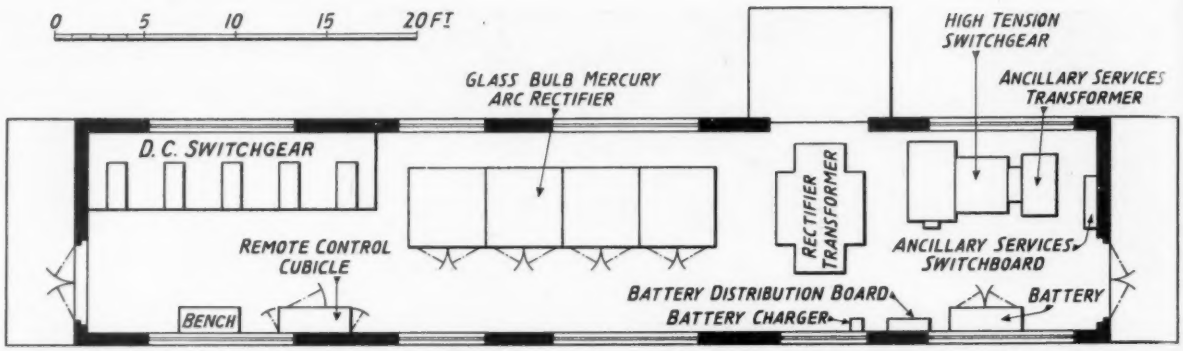
Due to the more intensive service to be run under electrification it was necessary to extend one side of the Bidston triangle so that freight or passenger trains could be accommodated on the triangle. As this triangle is on an embankment a considerable amount of tipping had to be done and two culverts extended. Furthermore, the culvert over the Birkett near Birkenhead North had to be extended to allow of access to the new repair shop and carriage shed. The repair shop is 325 ft. long and 56 ft. wide, and a 15-ton overhead electric travelling crane runs the whole length. There are three roads each capable of accommodating a three-car unit, and two of these are provided with pits. Behind these roads is a shop area of approximately 300 sq. ft., and the stores, above which are offices. A universal machine comprising a lathe, drill, hacksaw, and planer is installed, together with a wet tool grinder. Power is supplied by a 440-volt feeder from the auxiliary transformer in the Birkenhead North substation. The carriage shed adjoining has four roads each capable of accommodating a six-car train; three of these roads have pits. In this shed the stock will be washed and receive daily examination and maintenance. Overhead trollies with jumpers enable the trains to run in and out under power.

The stations on the Wirral line have been reconstructed or modernised as part of the scheme; an illustrated description of this work appeared in THE RAILWAY GAZETTE of March 18. Certain alterations and additions to the existing mechanical signalling arrangements and track circuits were carried out at various points to enable the intensified service to be run. The remodelling of the triangle at Bidston and the alterations at Birkenhead Park, to convert it from an interchange to a through working station, have involved the rebuilding of signal boxes and at Bidston one box has replaced the two former boxes.

The normal signal supplies are given at 240 volts single-phase from Hoylake and Bidston substations where they are fed direct from the ancillary services board. The feeders are run to the nearest signal box where an automatic change-over contactor is provided for changing over to an emergency supply in the event of the failure of the railway substation supply. The emergency supplies are brought from West Kirby and Wallasey Village respectively, from the supply authority at those places. The supply given from Hoylake substation is used for the West Kirby to Moreton section and that from Bidston for the New Brighton to Moreton and Birkenhead North section. The Birkenhead North to Birkenhead Park signal supply is provided by the Mersey Railway at Birkenhead Park.

Power Supply and Distribution

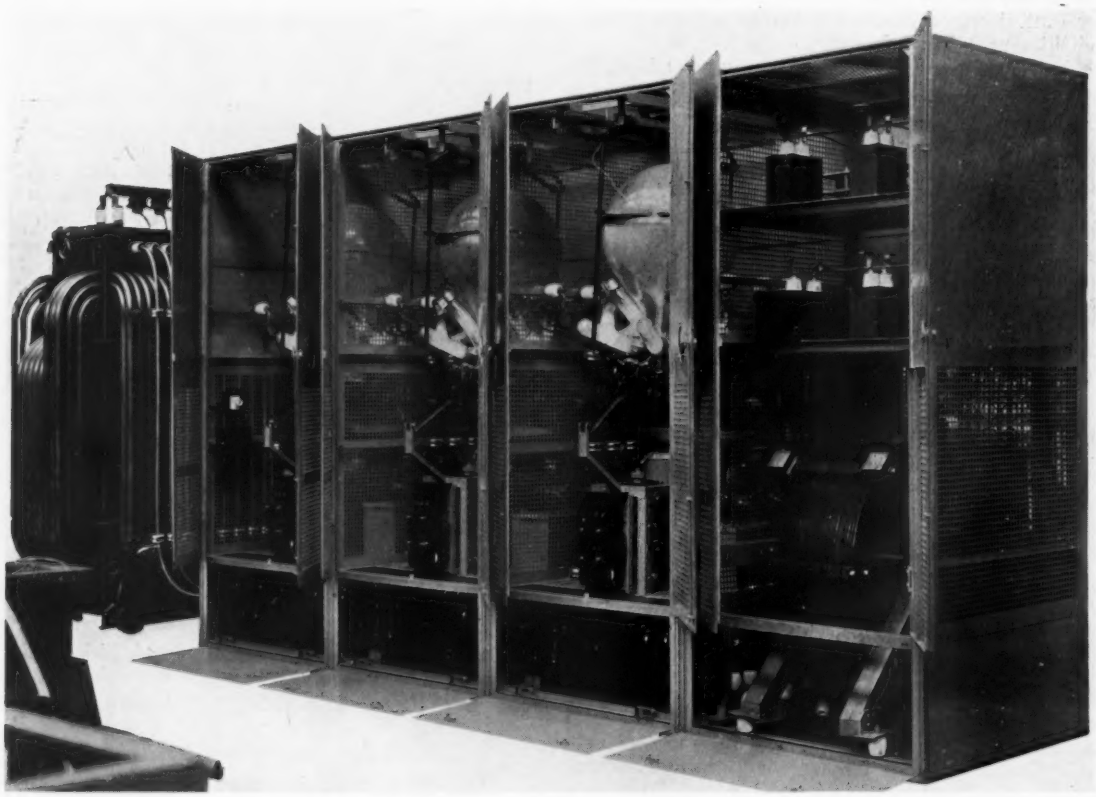
Three-phase 50-cycle power is transformed to 11 kV. at the Liverpool Corporation's Harrington Street substation, and transmitted by cable to the railway substation at James Street, where it is metered and provision made for the isolation of either of the two feeders. From James



Plan of standard rectifier substation, remotely-controlled, Wirral lines

Street substation it is taken by two feeders, each of 0·25 sq. in. per phase cross-section, to the railway substation at Birkenhead North. The approximate length of each cable is 5,800 yd. and most of this is laid on battens supported by brackets well up in the roof of the Mersey Railway's tunnel. The cable on this section of the route is lead covered and jute served. There is also a pilot cable comprising the pilots for the feeder protective relays, the pilots for transmitting the kW. demand metered at James Street to a repeating instrument in Birkenhead North Substation, and telephone pairs giving communication to the Mersey Railway, and to Liverpool Corporation, and provision for spares. The lines electrified aggregate 10·5 route or 24 track miles, and the estimated yearly energy consumption is 6,000,000 kWh., of which about 5,800,000 kWh. will be for traction purposes. The ratio of the average load to the maximum half-hourly load (2,750 kW. estimated) is about 1:4, and the annual average power factor will be 0·9 to 0·95 lag. The estimated transmission losses in the 11 kV. lines, with a total length of about 12 miles, approximates to 2·5 per cent. of the energy transmitted. All the energy is being supplied from the steam power station owned by the Liverpool Corporation.

The greater part of the e.h.t. feeders, supplied and erected by the J. L. Eve Construction Co. Ltd., is of the overhead type and consists of stranded copper conductors. The insulators are of special anti-fog type made by



600 kW. bank of Hewittic glass bulb rectifiers; on the left is the main transformer, and in the cubicle on the right is the d.c. smoothing equipment. The overload capacity of the rectifiers is 25 per cent. for two hours and 200 per cent. for 10 seconds

Steatite & Porcelain Products Limited. The earth wire is below the conductors. In general, the clearance between the nearest power wire and the telegraph and telephone wires on the opposite side of the track is 35 ft., but in some places it has been reduced to a minimum of 30 ft.

The line complies with the Electricity Commissioners regulations and is of wood pole construction. Double circuit lines with A poles or H poles are used except for about 400 yd. beyond Moreton station, where Rutter poles are used to give room for a footpath in addition to the feeder route in the narrow margin available. Cabled sections are to the new British Standard Specification except for the tails leading into the substations, for which the heavier insulation of the old standard has been used. There are four places where a run of overhead construction has been broken by the introduction of a cable section on each side of signal posts, so as to avoid obscuring the signals and also to give clearance to a man working on the signal posts.

On the Wirral lines a positive conductor rail of 105 lb. a yd. flat-bottom section with running-rail return is used. The conductor rails are normally in 60-ft. lengths and bonded by a welded U-shaped copper bond underneath. The running rails are bonded by a similar welded U-shaped copper bond of 0·166 sq. in. cross-section. Welded cross bonding is carried out at frequent intervals by stranded copper bond 0·166 sq. in. cross-section. Hook switches are provided for isolating sections of the conductor-rail, and these are mounted in the permanent way adjacent to the conductor rail. Compared with the normal, the profile of the conductor rail has been reduced in width on the bottom flange and the material added to the head.

Substations

The traction substations convert the 11-kV. current into 650 volts d.c. by means of transformers and rectifiers, and feed it out on the track through high-speed breakers. Except that Bidston and Birkenhead North have additional tracks to feed, all six substations are alike so far as conversion and d.c. distribution are concerned. The arrangement of h.t. switchgear and auxiliaries are exactly alike at Meols, Hoylake, Bidston, and Wallasey, and consist of an oil circuit breaker controlling the supply to the rectifier and a switch fuse controlling the supply to the ancillary services transformer. These four substations are virtually duplicates of one another. There is more h.t. switchgear at Moreton and Birkenhead North; the feeder system is protected by time graded overload and earth leakage relays.

It is a restriction of the Liverpool supply that two feeders shall not be paralleled, and to arrange this alternate substations are fed from alternate feeders with provision to bring all on to one feeder subject to the necessary interlocks. The form of substation is such as

Control room attached to Birkenhead North substation

to give a direct route for the current through them, thus resulting in long narrow substations, which fit conveniently into the sites available on the grass verges of the railway.

The h.t. switchgear is of Crompton, Parkinson manufacture and is solenoid-operated for remote control from 50-volt batteries with separate leads for operating, tripping, and indicating; it is of the compound filled vertical isolation type, with a rupturing capacity of 250 mVA. at Birkenhead North and 150 mVA. at the other substations. The rupturing capacity has been tested on the new B.S.S. cycle at full rating and at three lower ratings. The relays and kWh. meters are of M.V.E. manufacture, the latter being fitted with a contacting device so that, by connecting in a printometer instrument, a record of the input to a rectifier over any desired period can be obtained.

Hewittic glass-bulb mercury-arc rectifier sets are used in all substations, and each 600 kW. set is arranged for six-phase connection in three bulbs in separate cubicles; a fourth cubicle contains d.c. smoothing equipment. The cubicles have been interlocked with the rectifier oil switches so that it is possible to obtain access to them only when the transformer oil switch is open. The busbars are enclosed in the lower part of the cubicle. Provision is made for checking the sharing of load by the bulbs by means of a portable three ammeter set. The anodes are protected by Allen West tetrachloride fuses, mounted in a compartment in front of the busbars.

The d.c. switchgear is of B.T.-H. manufacture arranged for solenoid operation held in by the main current. One breaker for each substation is arranged for closing off the the track. This gear does not present any special features, except perhaps the enclosure of auxiliary switches, relays, and small contactors. On these boards, as well as on the other details, small wiring, solenoid supplies, and d.c. cable is of the flameproof type.

Each substation contains an ancillary services transformer supplied through a switch fuse with limiting resistances. The B.T.-H. transformers step down to 420 volts and are specially insulated to resist surges. At Birkenhead North this transformer is of 100 kVA. capacity as it also serves to supply the car shed and repair shop. At the other substations the transformers are of 25 kVA. capacity, and in addition to substation services provide for station lighting, station services, and signal supply. The l.t. output is controlled by English Electric switch fuses, the single phase loads being approximately balanced. Two similar transformers are installed at Leasowe and Wallasey Village, and except that they and their switch fuses are of the outdoor type, they are similar and supply station lighting at these places.

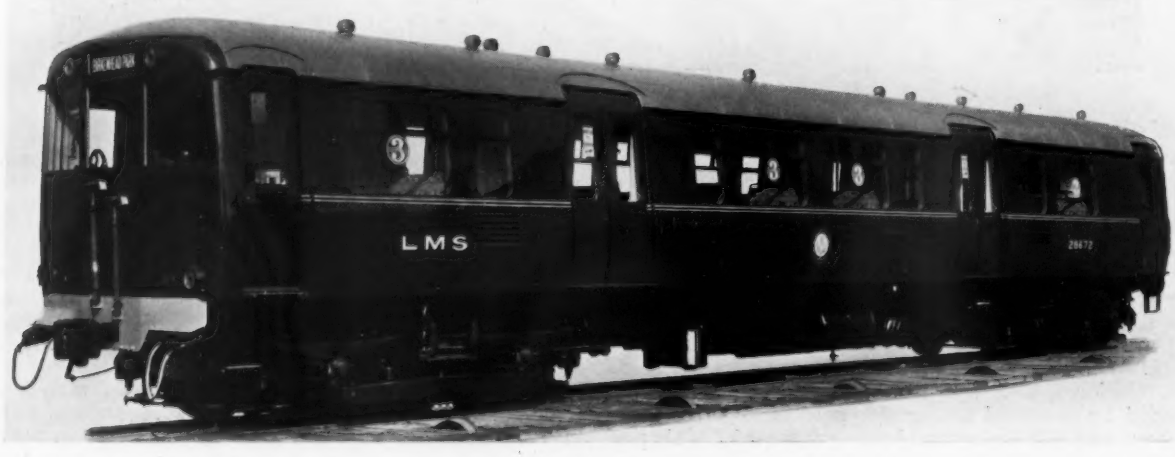
There is one battery at each substation, and it is used for tripping and closing, for remote control apparatus and for emergency lighting. The batteries were supplied by Britannia Batteries Ltd. and are of the lead acid type; they have been tested on a duty cycle which should be well in excess of requirements. They are trickle-charged by Westinghouse rectifiers. Battery distribution is taken through a fuseboard with English Electric fuses.

Remote Control

All six substations are remotely-controlled from a single room at Birkenhead North. The remote control apparatus was made by the Automatic Telephone and Electric Co. Ltd. and gives individual control and indication of all breakers. The formation of the railways requires two sets of pilots, one for Bidston and Wallasey substations, the other for Moreton, Meols, and Hoylake substations. In each case a spare pilot is provided with facilities for changeover from one to the other. The pilots are continuously proved and an alarm is given if one becomes defective. The operation does not call for special comment, except to note that the control of the d.c. breakers is arranged so that those at both ends of one track section may be closed simultaneously. The length of time required to perform an operation varies from 3 sec. to 10 sec. This time includes automatic check back, without which no operation can be carried out. The adoption of voice frequency metering has enabled one meter reading to be obtained from each substation simultaneously, and provision is made for obtaining the d.c. output of the rectifier in amp., or its voltage, or the voltage at the end of any track feeder; the latter facility provides a useful check on the performance of d.c. isolation.

Rolling Stock

The rolling stock comprises nineteen three-car sets each consisting of a motor coach, trailer, and driving trailer. The coaches are of all-steel welded light-weight saloon type, with air-controlled sliding doors; the motor-coaches were built by the Metropolitan-Cammell Carriage & Wagon Co. Ltd. and the driving trailers by the Birmingham Railway Carriage and Wagon Co. Ltd. Some of the trailers were built by each company. Three-car trains will be used in slack periods and six-car trains in rush hours. The underframes are fabricated of special sections of Kuplus copper-bearing steel, which has an ultimate tensile strength of 37-43 tons per sq. in. and a yield point



Metro-Cammell 540 h.p. motor-coach weighing 36 tons

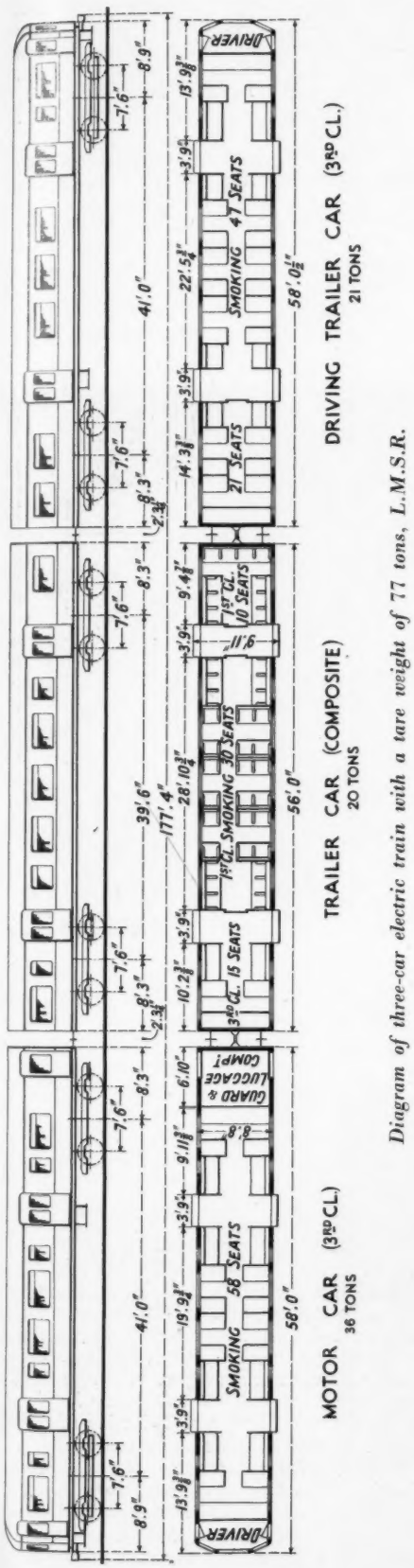


Diagram of three-car electric train with a tare weight of 77 tons, L.M.S.R.

of 22-23 tons per sq. in. The car floors are of galvanised corrugated sheet covered with Induroleum. The body framing is covered with steel outer panel plates presenting a smooth exterior and fitted with fixed windows having above them deep sliding extractor ventilator lights made by Worcester Windshields Limited. The seats are of both the cross and longitudinal types, non-reversible, and as there is no vestibule connection between the cars there is a full width seat right across each end. All the doors, whether sliding or hinged, are of Alpax. The outer ends of the motor-coach and driving trailer are equipped with Buckeye centre couplers and the couplings between the individual coaches of a three-car set consists of a single slotted link connected through pin joints to drawbars pulling on rubber springs. Side buffers only are provided between these coaches, the outer ends of a three-car unit not being similarly fitted, as the centre coupler functions as a buffer when required. Destination lights of the tramway type are mounted at each end of the triple-car set.

Motor and trailer bogies are of welded steel construction throughout, and are fitted with 36-in. disc wheels. Swing-link bolsters supported on helical springs are used, and they have side rubber cushioning stops. The motor bogies have Skefko roller bearing axleboxes and the trailer bogies are fitted with Hoffmann boxes; both makes are supported by independent overhung laminated springs with rubber auxiliaries. Braking is on the Westinghouse electro-pneumatic system and is operated in conjunction with a dead-man equipment on the controller, which gives instantaneous braking. The Westinghouse compressor and reservoirs are slung beneath the underframe, and the cylinders are similarly located. The force from the primary pull rods is transmitted to the cross-rods through rollers, as there are several sharp curves on the line. The electrical control supply for the brake is from the low-tension (52 volts) train system. There are two blocks on each wheel.

The compressed-air door operating equipment was supplied by G. D. Peters & Co. Ltd. The Alpax sliding doors on each coach are automatically operated by air motors controlled electrically by the guards. All doors on each side of a three-car or six-car train can be opened or closed from the guard's van and in addition the trains are fitted with passenger-opening push buttons. By means of these, passengers wishing to enter or leave the train at stations with light traffic are able to open individual doors when the circuit is made for passenger operation by the guard. This prevents the passengers in the train being unnecessarily exposed in inclement weather. Before the train departs the guard closes all doors opened and cancels the local opening circuit.

Electrical Equipment

The complete electrical equipment of the trains was supplied by the British Thomson-Houston Co. Ltd., and is suitable for running over both third-rail and fourth-rail sections. Collecting shoes are carried on the motor-coach and driving trailers. Each motor-coach is equipped with four traction motors driving through straight spur gearing of 63 : 16 ratio. The motors have ratings of 135 h.p. one-hour and 93 h.p. continuous. They are of the cast steel box-frame type with roller armature bearings and sleeve axle bearings. They are self-ventilated with a sliding bellows connection, enabling air to be drawn through ducts in the coach and a louvred opening in the coach side.

The four motors are connected with pairs permanently in parallel and with series-parallel control of the two pairs. Running notches are provided only for the full series and weak field positions. The master controller also has a shunting notch for slow speed running on the first series point. Provision is made for cutting out a pair of defective motors on any equipment by means of a manual switch on each motor switch group. In addition, on a six-car train either equipment can be cut-out from any driver's cab by means of push-buttons which operate 9-point control cut-out relays on each three-coach train.

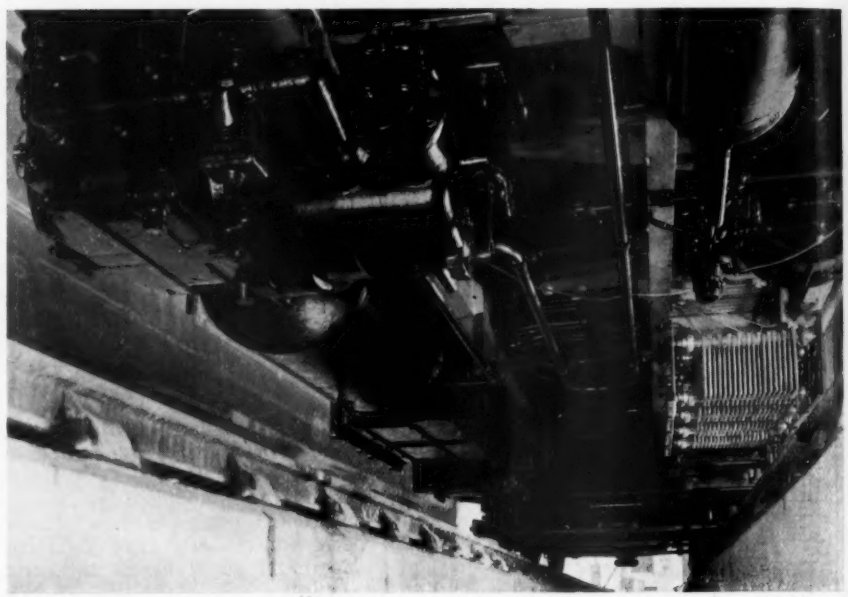
The control equipment is arranged for electro-pneumatic operation and consists principally of individual electro-pneumatic contactors arranged in four groups. The line switchgroup contains two line switches together with a double element overload relay. Special contact tips and arcing horns are used in conjunction with a divided arc chute, which enables very severe short-circuit conditions to be dealt with easily. On test, a single switch successfully interrupted an

inductive load of 10,000 amp. at a tension of 600 volts. The main switch group contains 11 unit switches, one field tap relay, and the accelerating relay. Easily removable covers are provided both at the back and front of the groups and these bed on to felt packing to form a dust-tight seal. The two motor switch groups each contain a reverser, four unit switches for field control, and the motor cut-out switch by means of which either pair of motors can be isolated. Other items mounted on the underframe include main resistances of the cast-grid type, earthing contactor case, motor-generator set, and equipment isolating switch and fuse. A Westinghouse compressor is provided and this supplies air for operating the control, brakes, and door gear.

For coupling between units, 19 point plugs and sockets are provided for both control and auxiliary 19-core train cables, and these are bifurcated to permit coupling up from either side of the train. To enable a motor-coach to be readily removed from a three-car train, plugs and sockets are provided for the control and auxiliary connection to the plain trailer. Between the plain trailer and driving trailer permanent couplers are fitted.

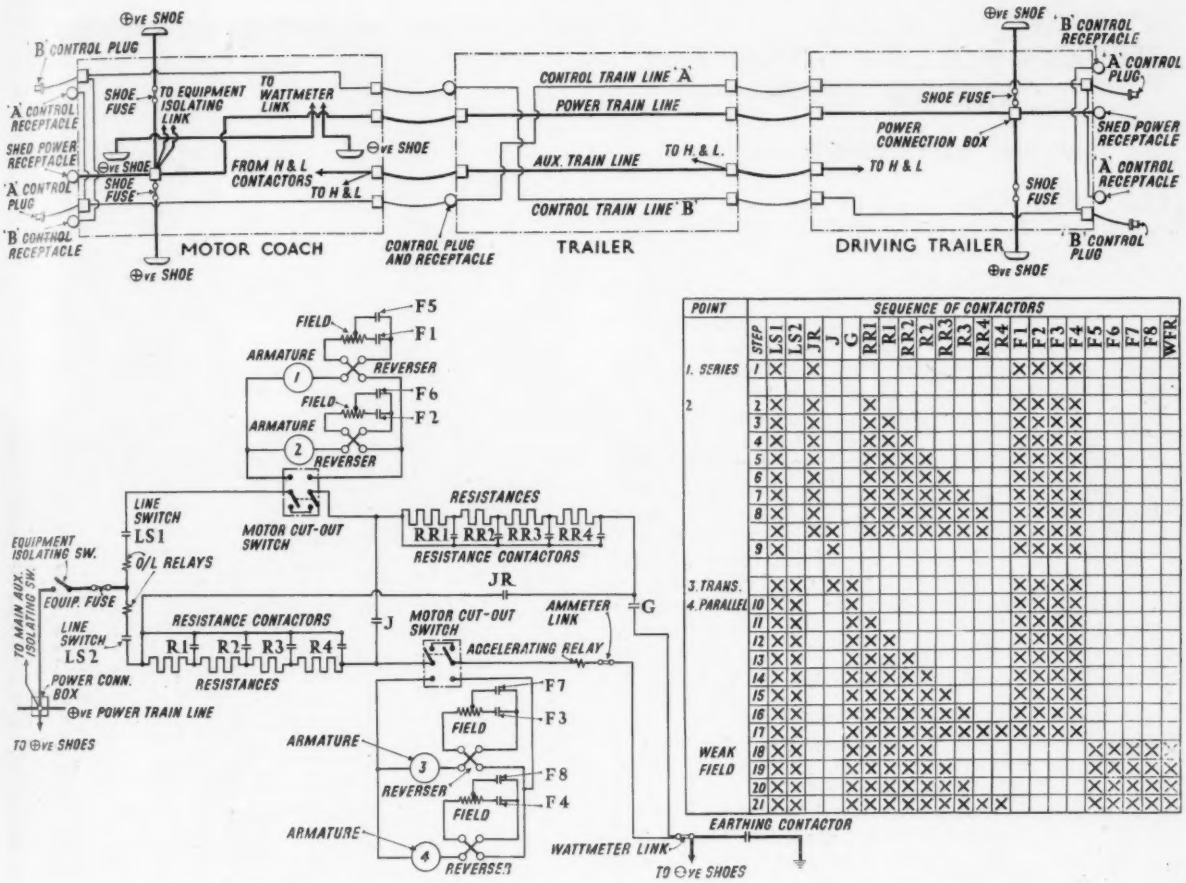
In addition to the control train cables there is also a positive bus line connecting the coaches in a three-car unit. Positive collector shoes are fitted on both motor-coach and driving trailer and the busline permits power to be taken from either end of the train. There is also a three-core power coupler between the coaches in a unit, and these provide lighting and heating for the train under control from the motor-coach. There are no power connections between the separate three-car units when a train is made up of more than one rake. A power receptacle is fitted at each end of a three-car unit to enable a shed plug to be used to supply power when the train is in the shed and out of contact with the conductor rail. Low voltage control for the electrical equipment, air brakes, and door gear is provided by a 1 kW. motor-generator set which supplies power at 52 volts.

An emergency battery is connected across the 52-volt generator through a cut-out relay and this provides for emergency control in case of failure of the motor-generator set. An emergency light relay is connected across the 600-volt supply and in the event of failure of this supply the emergency lights throughout the train are connected to the battery. The battery consists of 36 Nife alkaline cells, supplied by Pritchett & Gold and E.P.S. Co. Ltd., and are housed in a steel cupboard slung from the motor-coach underframe.



Above: Underneath view of L.M.S.R. Wirral motor-coach showing electrical and brake equipment mounted below the underframe

Left: Interior of third-class saloon in the new Wirral electric stock. The sliding doors are air operated, under the control of the guard, but individual doors can be opened by passengers



POINT	STEP	LS1	LS2	JR	J	G	RR1	R1	RR2	R2	RR3	R3	RR4	R4	F1	F2	F3	F4	F5	F6	F7	F8	WFR
1. SERIES	1	X		X											X	X	X	X					
2	2	X		X			X								X	X	X	X					
	3	X		X			X	X							X	X	X	X					
	4	X		X			X	X	X						X	X	X	X					
	5	X		X			X	X	X	X					X	X	X	X					
	6	X		X			X	X	X	X	X				X	X	X	X					
	7	X		X			X	X	X	X	X	X			X	X	X	X					
	8	X		X			X	X	X	X	X	X	X		X	X	X	X					
	9	X		X			X	X	X	X	X	X	X		X	X	X	X					
3. TRANS.		X	X		X	X									X	X	X	X					
4. PARALLEL	10	X	X			X									X	X	X	X					
	11	X	X			X	X								X	X	X	X					
	12	X	X			X	X	X							X	X	X	X					
	13	X	X			X	X	X	X						X	X	X	X					
	14	X	X			X	X	X	X	X					X	X	X	X					
	15	X	X			X	X	X	X	X	X				X	X	X	X					
	16	X	X			X	X	X	X	X	X	X			X	X	X	X					
	17	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X					
WEAK FIELD	18	X	X			X	X	X	X	X									X	X	X	X	
	19	X	X			X	X	X	X	X	X								X	X	X	X	X
	20	X	X			X	X	X	X	X	X	X							X	X	X	X	X
	21	X	X			X	X	X	X	X	X	X	X	X					X	X	X	X	X

Diagram of main power circuits of the Wirral multiple-unit trains, 600 volt d.c. lines

As the Wirral trains will be running over the Mersey Railway, provision has been made for a negative shoe to operate on the Mersey fourth rail. Running rail return cannot be used on the Mersey line owing to the track signalling circuits. An earthing contactor is normally closed when running on the Wirral lines and this connects the negative to the running rails so that the negative shoe is not in use.

On each three-car train positive lighting, positive heating, and common negative return buslines are provided. The lighting control is by means of a latched contactor mounted in the driver's cab on the motor-coach and controlled by set and trip push-button switches in the guard's van. Each coach has its own lighting switch and fuse which is normally left in the closed position.

The heaters, each of 500-watt rating, are in pairs in series on the 600-volt supply. Each coach has a total of 10 kW. of heaters, of which the driver's cab and guard's van each take 1 kW. Control of the passenger compartment heaters is by means of a thermostat in the motor-coach with alternative direct control from the driver's control panel on the motor-coach. Both lights and heaters in the driver's cab and guard's van are under independent control.

Contractors for Wirral Electrification

J. L. Eve Construction Co. Ltd.
Steatite & Porcelain Products Limited.
Crompton, Parkinson Limited.
Hewittic Electric Co. Ltd.
Allen, West & Co. Ltd.
British Thomson-Houston Co. Ltd.
English Electric Co. Ltd.
Britannia Batteries Limited.
Westinghouse Brake & Signal Co. Ltd.
Automatic Telephone & Electric Co. Ltd.
Metropolitan-Cammell Carriage & Wagon Co. Ltd.
Birmingham Railway Carriage & Wagon Co. Ltd.
United Steel Companies Ltd. (Kuplus steel).
Skefko Ball Bearing Co. Ltd.
Hoffmann Manufacturing Co. Ltd.
Pritchett & Gold and E.P.S. Co. Ltd.
G. D. Peters & Co. Ltd.
Worcester Windshields & Casements Limited.
Lightalloys Limited (Alpax doors).
W. T. Henley's Telegraph Works, Limited (H.t. cables).
Lancashire Steel Corporation Limited (Conductor rails).
A. G. Wild & Co. Ltd. (Centre couplers).

BRAZILIAN EXTENSION.—Another stage in the electrification of the Central Railway of Brazil was concluded on February 20, when electric services from Madureira to Nova Iguassú on the main line, and to Bangú on the Santa Cruz branch, were officially inaugurated. Full details of the conversion by Metro-Vick of the inner suburban lines were given in the issue of this Supplement for March 4.

JUGOSLAV ELECTRIFICATION.—It is reported that studies for the electrification of certain Jugoslav lines are being made by the State Railways in conjunction with Italian manufacturers of electrical equipment and rolling stock.

MODERN ROLLING STOCK FOR TYNESIDE LINES

New and rebuilt electric vehicles

THE original rolling stock of the north Tyneside electrified lines of the North Eastern Railway, converted in 1904, comprised 39 motor-coaches, 33 trailers, and two motor parcels vans, a total of 74 vehicles. By 1915 the total had increased to 90 vehicles, but three years later a fire at Walker Gate sheds destroyed 19 motor-coaches and 15 trailers. These were replaced by new stock during the ensuing four years, and the provision of additional vehicles brought the total up to 132.

As part of a modernisation scheme inaugurated in 1934, the L.N.E.R. decided to withdraw 90 cars and replace them with new stock, and at the same time modernise 36 of the remaining vehicles by the provision of new electrical and braking equipment. To that end an order was placed in 1935 with the Metropolitan-Cammell Carriage & Wagon Co. Ltd., for 64 two-car articulated sets and four single unit motor vans of all-steel construction. The 36 modernised cars are being used on the Newcastle to South Shields line, which was formally opened to electric traction on March 14. The reconditioning was carried out at the York shops of the L.N.E.R.

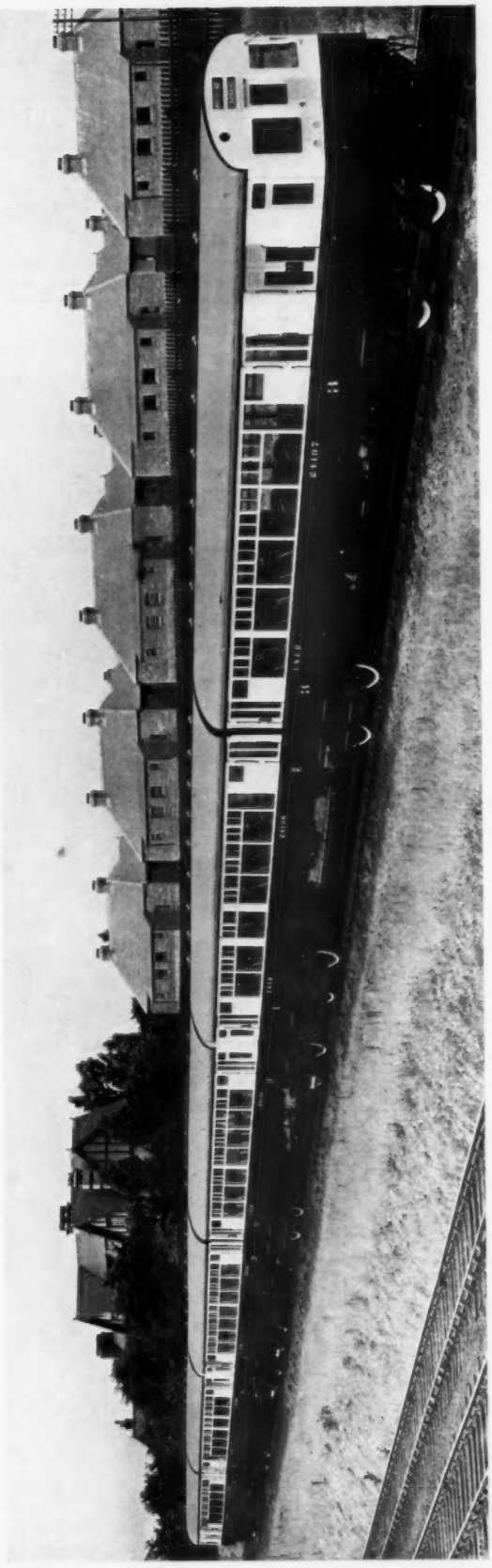
Mechanical Portion

Twin-articulated construction was selected for the new stock in order to save weight, and, in order to improve the comfort compared with the reversible rattan seats on the old cars, it was decided to instal bucket seats of the type used in the company's special excursion stock. The tare weight of a two-car set is about 56 tons. In rush hours the trains are made up of four twin-car sets, each of which differs slightly from the others in its seating accommodation and equipment, as indicated in the following table. The large saloon in each first class vehicle is convertible into third class for off-peak workings.

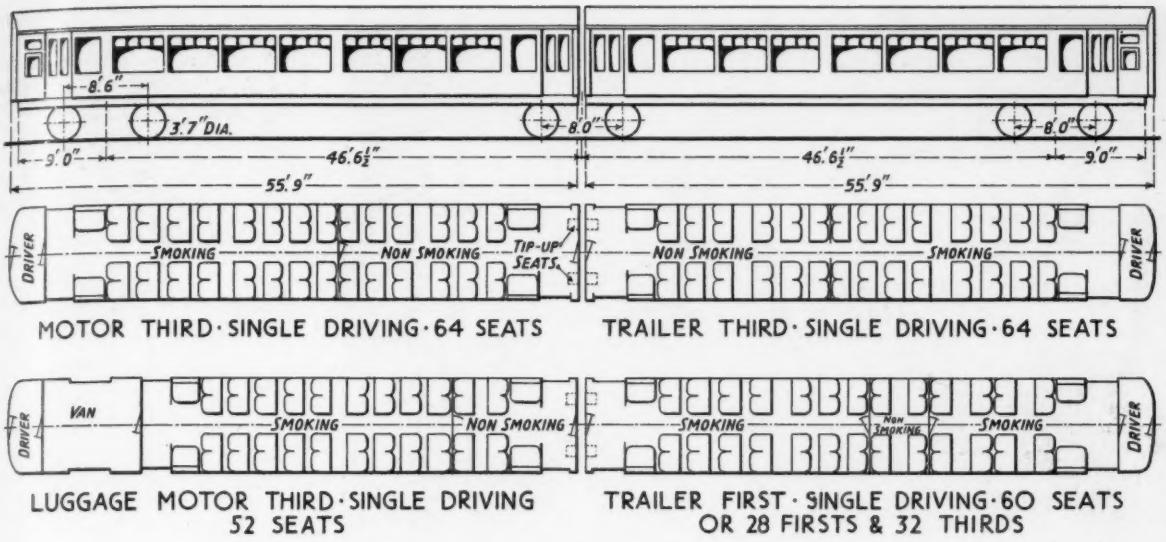
		Seats	
		1st	3rd
Driving luggage motor third ..	18 sets	—	52
Trailer first		60 or 28	— 36
Driving motor third	18 sets	—	64
Trailer third		—	68
Driving luggage motor third ..	16 sets	—	52
Driving trailer first		60 or 28	— 32
Driving motor third	12 sets	—	64
Driving trailer third		—	64

The body framing and underframe are formed as an integral structure. The underframes are built up of steel sections welded together, but in the body framing electric welding is used only for minor connections, the main joints being riveted. The floors are of steel with dovetail corrugations filled with J. W. Roberts cork flooring. No other noise or heat insulation is fitted, but air spaces are provided between the inner and outer body shells. The Rexine covering on the inner walls provides a large measure of noise insulation. The steel panel and roof sheets were supplied by Baldwins Limited.

The passenger accommodation comprises open-type saloons with Alpax sliding doors at each end of each body. The seats adjacent to the doorways are placed longitudinally, but the remainder are of the bucket type arranged in pairs on each side of the central gangway. The seats have Vito spring fillings and the backs are filled with quilted hair. The seat surrounds are of Dunlopillo



One of the new Metro-Cammell trains made up of four twin-car articulated sets



Diagrams of two of the twin-car sets now used on the North Tyneside lines of the L.N.E.R.

sponge rubber covered with Vaumol hide to match the general colour scheme. Strap hangers are provided near the ends of each body. The interiors of the saloons are finished in various colour schemes—one for the first and three for the third class. The walls and ceilings are covered in Rexine, the ceilings being of cream or broken white and the walls in two shades, the darker below the waist line. Uncut moquette upholstery material is used throughout. The floors are covered with coloured cork lino to suit the colour scheme, and in the first a fawn and brown carpet is provided. The floors of the convertible saloons are covered with Gesco cork tiling supplied by G. Stephenson & Co. Ltd.

The door and window surrounds are finished in cellulose to match the darker Rexine, and the metallic fittings are chromium-plated in the first class and cellulose finished in the third. Large windows with sliding shutter ventilators above are provided in the body sides, and there are torpedo extractor ventilators in the roof. Each window has a spring roller blind of double-sided Rexine. Lighting in each body is provided by twenty-four 60-watt lamps mounted in plain reflector fittings without shades. Tubular electric heaters are provided on the body sides and are protected by means of perforated guards. Each driving end is provided with a train indicator and marker lights, together with a hand-operated window wiper and air whistle. The guard's compartments and vans are provided with the usual fittings, including complete sets of rescue and fire appliances and first-aid outfits. Through communication for the driver or guard is provided by means of doors in the body ends. All the vehicles are fitted with centre buffer couplers of the cowhead type working in conjunction with the strong indiarubber springs.

The bogies are of the single bolster riveted type built up from rolled and pressed members and fitted with Taylor Bros. steel disc wheels. The axleboxes are of the standard plain bearing type with Armstrong lubricators, except on the last two twin units, the six bogies of which are fitted with Hoffman roller bearing axleboxes. The bogie under each driving end is fitted with two sandboxes air-operated by means of a foot control in the driver's cab. Westinghouse electro-pneumatic brake equipment is fitted to all the new vehicles; the Consolidated-Reavell compressors are fitted beneath the floors of the motor-coaches.

The first of the new trains was placed in service on July 30, 1937, and delivery of all the new coaches was completed by the end of last year. On January 3 the completion of the scheme was marked by the inauguration of a new train service. Stopping trains from Newcastle back to Newcastle via Tynemouth are now allowed only 53 min. for the round trip instead of 63 min. with the old rolling stock, and expresses from Newcastle to Tynemouth take 24 min. instead of 30, this acceleration being the result of the improved and higher capacity electrical equipment.

The four motor vans have a body length of 59 ft. and have two motor bogies pitched at 39-ft. centres. Two of these vehicles are driving-luggage-motor-thirds and work with a six-coach set of converted steam compartment coaches during peak periods; the other two motor vans are designed to work fish or goods services.

Electrical Equipment

All the electrical apparatus for the new trains was supplied through Associated Manufacturers of Electric Traction Equipment Limited. As members of this company, the British Thomson-Houston Co. Ltd., were responsible for the layout and erection; the traction motors were made by Crompton, Parkinson & Co. Ltd. and the control gear by Allen, West & Co. Ltd.

The motor-coach of each twin-car set is equipped on the outer bogie with two nose-suspended self-ventilated motors with a continuous rating of 154 h.p. at 210 amp. 600 volts and a one-hour rating of 216 h.p. at 295 amp. 600 volts. Spur gears of forged carbon steel, heat-treated after cutting, are used; they have a ratio of 71 : 18 and are enclosed in a pressed steel gear case having three-point suspension. The road wheel diameter is 43 in. The motors normally operate in parallel at 60 per cent. of full field strength, and the equipment has been designed for an average accelerating current of 300 amp. per motor. The two twin-car sets with Hoffman roller-bearing axleboxes have an earthing brush on the traction motors. Each motor is provided with two brush arms, and the armatures are carried in Skefko roller bearings. A dust trap is provided above the commutator at the point where the ventilating air enters the motor, so that the air drawn through the machine by the fan at the pinion end is relatively free from dirt.

As it was the intention to make the control for the new

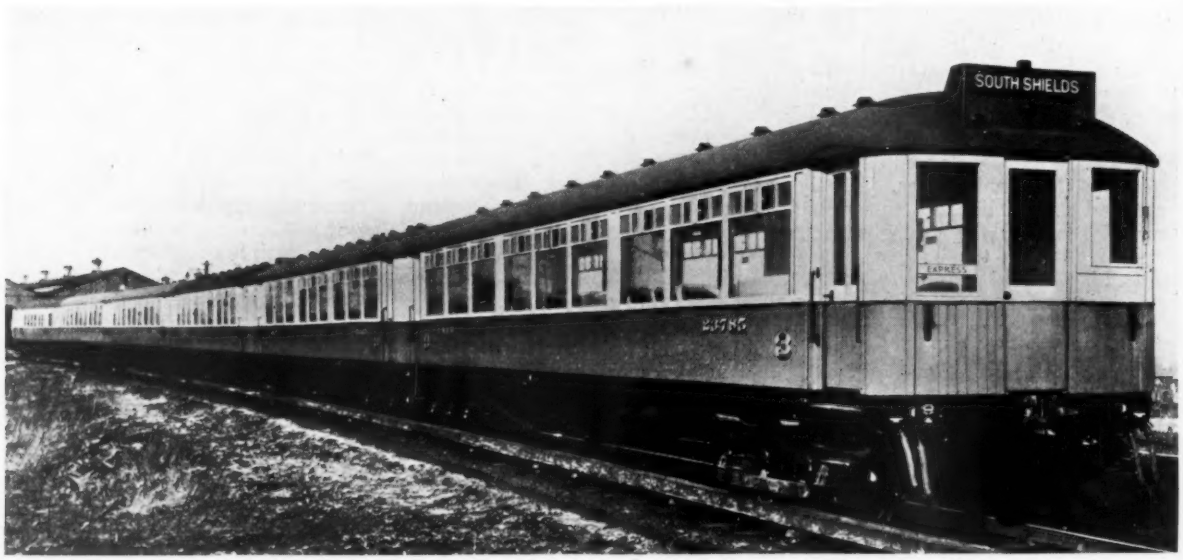
One of the new Metro-Cammell trains made up of four twin-car articulated sets

Interior of third class saloon of one of the new all-steel cars in the multiple-unit trains on the L.N.E.R. Tyneside electric trains

stock as similar to the old as possible, the B.T.-H. electro-magnetic contactor equipment was perpetuated, but the opportunity was taken to incorporate a master controller, a reverser, a control governor, and a compressor governor of modern design. The shoe gear and ice scrapers have been redesigned so as to be suitable for the new position of shoe beam (to the Ministry of Transport's standard for conductor rails) and the higher operating currents; automatic acceleration provides a new feature of the equipments, and should produce smoother acceleration and reduced energy consumption. A compressor synchronising wire and control wires for the remote operation of lighting are provided throughout the train, and in each driving position a 600-volt feed is introduced for the charging of a 50-volt battery for the electro-pneumatic brakes.

Low-temperature tubular heaters are provided, and so arranged in each coach that there are two parallel circuits of a number of heaters connected in series across 600 volts. The heating is controlled by a thermostat situated on one of the centre partitions in each coach body.

The main contactors are housed in a box on the coach underframe adjacent to the frames of the cast iron resistances; the reverser, circuit breaker, and details of control equipment for lighting and heating also are housed in separate cases on the underframe. In the driver's compartments, apart from the master controller with the usual dead-man handle, are the electro-pneumatic brake controller, the batteries and charging resistances and switches for the electro-pneumatic brake, the control switch, circuit breaker trip and reset switch, switches for cab and gauge lights; destination indicator and marker lights; push buttons for remote control of lighting, ammeter, and pressure gauge. In addition, in the driver's cab of motor-coaches there is a panel on which are mounted the main isolating switch, accelerating relay, multi-point control cut-out switch, and the compressor and control governor switches.



One of the modernised trains transferred from the North Tyneside routes to the South Shields line